Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY
LUDLOW GRISCOM
CARROLL WILLIAM DODGE
} Associate Editors

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Vol. 32. January, 1930. No. 373.

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ASTER AMETHYSTINUS (right), A. MULTIFLORUS (left), and A. NOVAE-ANGLIAE (center)

Rhodora

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THE NEW ENGLAND BOTANICAL CLUB

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ASTER AMETHYSTINUS AN OBVIOUS HYBRID

H. C. Benke

(Plate 192)

Although no positive proof through experiment has come to my notice, yet, in view of personal experience with the very pretty and rare *Aster amethystinus* Nutt., I feel quite safe in declaring it to be a hybrid. Hybridism has long been suspected, so it is well to add my own observations here. The genus *Aster* is a favorite of mine and I have had opportunity for nearly thirty years to study it in the field, especially in the Central States, where the species under discussion grows. In that long period of time and among vast numbers of asters seen, only on three occasions was *Aster amethystinus* found.

1. While waiting for a train at the station at Kaukauna, Wisconsin, fifteen years ago, a field of asters was noted along a ditch or canal some 100 feet to the north. Walking closer to the plants, I came upon a large, bushy, vigorous-growing plant of the species under consideration. There were numerous plants of *A. novae-angliae* L. about, for this species is common in the region. Of. *A. multiflorus* Ait.[1] there were but a few plants, for it was rare in that locality, but they were quite close by—not more than five feet away. Sample branchlets of the plant were obtained for the herbarium. There was but a single plant in evidence. It is my number 767, Kaukauna, Wisconsin, 1914, and is now in the Public Museum of Milwaukee.

[1] This aster, so well known as *A. multiflorus* Ait., appears to be the original Linnaean species *Aster ericoides* L. Sp. Pl. 875. 1753. See Mackenzie, Rhodora 28, p. 65. 1926.

2. Many thousands of wild asters were seen through the succeeding years in Wisconsin, Illinois, Missouri, Kansas, and other states, all in its range, but not until October 2, 1926, did I come upon another specimen, which was found growing in the edge of a Chicago suburb on a bit of original prairie. This is my number 4316 in the herbarium of Field Museum. With the sheet is placed another giving samples of species in closest proximity and bearing a notation, in part, as follows:

"*Aster amethystinus* Nutt., no. 4316, was found growing in a vacant lot about one-half mile south-east of the railroad station at Edison Park, a suburb north-west of Chicago.

"On this sheet are aster species found growing in proximity—the only species within a hundred feet or so.

"A. *Aster multiflorus* Ait., plants within five feet north and also south of No. 4316; and B. *Aster novae-angliae* L., a few plants a bit farther north and north-east of same. The only other species in proximity was C. *Aster ericoides* L., var. *villosus* T. & G.

"The characteristics of No. 4316 are so evidently an average between A and B in every way that one may regard *Aster amethystinus* as a hybrid with constant qualities between the two, No. C being out of the reckoning."

3. It was two years later, on September 29, 1928, that I came upon my third specimen in an extensive field of original prairie,[1] several miles to the north-east of the locality previously mentioned, about Norwood Park, another suburb of Chicago. Specimens of branchlets were again obtained—my No. 4868 in the herbarium of Field Museum.

A photograph, submitted herewith (plate ——), was taken in the field showing one of the tufted branches of *Aster amethystinus* at the right in the picture, other branches—not shown—being widely spreading or reclined, while a plant of *A. novae-angliae* is growing quite close by with *A. multiflorus* somewhat farther removed, as indicated in the left of the picture.

To summarize the evidence: In each case there was but a single plant (or tuft, branching from the base), the herbarium specimens on file being but branchlets or off-shoots and not complete plants.[2] The plants were all out of the range of *A. oblongifolius* Nutt., which

[1] It is to be regretted that this fine field of virgin prairie plants is being destroyed by a large colony of workmen, camping there with their horses.

[2] It was my good fortune to be able to revisit the site of the second plant discussed each fall since 1926, and I found the plant persisting, but it is still the single plant it was when first seen, no other plants having appeared to this time.

does not occur in the regions cited, a species with which it might be confounded except for its strict habit as seen in the field and its occurrence as solitary and rare plants—a second specimen was not to be found in the neighborhood in any case cited. It might be overlooked, however, because of other similarities in regions where *A. oblongifolius* is common—the Illinois and Wisconsin banks of the Mississippi River, for example. The presence in close proximity of the two species before mentioned in each case observed and the strikingly intermediate characteristics of the plant between the two furnish added circumstantial evidence that this charming aster may, with good reason, be regarded as a hybrid.

CHICAGO, ILLINOIS.

EXPLANATION OF PLATE 192

ASTER AMETHYSTINUS (right) with A. MULTIFLORUS (left) and A. NOVAE-ANGLIAE (center).

A NEW FORM OF ASTER AMETHYSTINUS.—On October 5, 1924, while in the western part of Worcester, Massachusetts, on a quest of *Aster amethystinus*, I found a group of plants, with altogether some thirty stalks, all bearing pink-rayed flowers, a specimen living plant of which has been placed in the Botanic Garden at Cambridge. This plant, elsewhere unknown, is here proposed as

ASTER AMETHYSTINUS Nutt., f. **leucerythros**, n. f., ligulis roseis.—MASSACHUSETTS: along remnants of old wall once a boundary of Liberty Farm of Abby Kelly Foster fame, Worcester, October 5, 1924, *E. W. Bemis* (TYPE in Gray Herbarium).—EARL W. BEMIS, Worcester, Massachusetts.

SOME ADDITIONS TO THE NEWFOUNDLAND FLORA.—The summer of 1929 from mid-June to mid-September I botanized in southwestern Newfoundland while my husband fished the salmon streams. Mr. Richard P. Whittington from his headquarters at Spruce Brook furnished us cabins on Barachois Brook, Harry's Brook and Highlands Pond successively.

Professor Fernald had said "Bring back anything rare or interesting"—a puzzling commission to an amateur guided only by the manuals published several years ago. And I frequently put specimens to press with a feeling that, absorbingly interesting as they were to

me, they were probably very old stories to the Gray Herbarium. Four, however, turn out to have significance.

On the right bank of Barachois Brook near the mouth *Hydrocotyle americana* L. was abundant. Rare? Hardly likely. Yet now Professor Fernald tells me that my specimens are the first from Newfoundland. Beside the cabin at Force le Plain pool on Harry's Brook grew handsome clumps of an *Anemone* taken to be *A. virginiana* L. Professor Fernald says it is *A. riparia* Fernald, not before found in Newfoundland. New also is *Impatiens pallida* Nutt. which grew luxuriantly on Crabbes Brook at the entrance to the path which leads from Whitecliff Pool (1 mile above the railroad bridge) to Crabbes station. And new an unfamiliar *Potamogeton* pulled up with a handful of *P. bupleuroides* near the bridge pool on Highlands Brook. This proved to be *P. subnitens* Hagström, a hybrid between *P. bupleuroides* Fernald and *P. gramineus* L.

Four plants not previously reported from the island make, I submit, as satisfying a season's catch as did the salmon and trout long since devoured. Of *Lotus corniculatus* L. and *Crepis biennis* L., also found there for the first time, the less said the better except to hope, for the sake of Newfoundland farmers, that I pulled up the sole specimens of each and that they will never be found there again.—R. B. KENNEDY [MRS. SINCLAIR KENNEDY], Patterson, Putnam County, New York.

A NEW LOCO FROM THE EDWARDS PLATEAU OF TEXAS

V. L. CORY, *Grazing Research Botanist*

INTRODUCTION

From about the middle of March to the middle of May of this year (1929) a survey of the loco plants of western Texas and southern New Mexico was made by the Bureau of Animal Industry of the U. S. Department of Agriculture. Through the courtesy of Dr. C. D. Marsh, under whose direction the work was done, and his associates of the Department of Agriculture an opportunity was afforded the Texas Agricultural Experiment Station to coöperate in this important work, and this opportunity was gratefully accepted. Thus it was the writer's good fortune to have a small share in this undertaking, and

he wishes, both on behalf of the Texas Station and of himself, to express deep appreciation of the consideration and courtesy shown to us in this matter.

Each of the five field workers engaged in this survey was allotted a definite territory to cover, and the area worked by the writer consisted of that portion of the Edwards Plateau lying east of the Pecos River. This paper is a contribution to the knowledge of the distribution of loco in that area as gained through the prosecution of this work. In the identification of species the writer has been greatly assisted by Dr. Ivan M. Johnston of the Gray Herbarium.

Description

Astragalus argillophilus Cory, sp. nov. Perennial, decumbent, in vigorous specimens as much as a meter across, much branched from a woody root and with the tips of frui ing branches ascending or erect, densely silky-villous throughout and tomentose; stipules 10 mm. long, whitish, membranaceous, prominently green-veined, long-acuminate, adnate to the petiole; leaves 10–20 cm. long with long petioles and about 11 or 12 pairs of leaflets, villous throughout with weak, spreading hairs; leaflets 19–29, 4–15 mm. wide and 7–30 mm. long, elliptic to ovate, acute, entire, villous-tomentose on both surfaces; flowers in dense axillary racemes, which are 4–12 cm. long; peduncles 10–20 cm. long, with pedicels 1 mm. long subtended by very villous subulate bracts 5 or 6 mm. long, or as long as the calyx-tube; calyx cylindric, 9–12 mm. long, the subulate teeth nearly equaling the tube, villous; corolla ochroleucous, rarely yellow or purplish, about 15 mm. long, the wings and banner considerably surpassing the obtuse keel; pod 15–20 mm. long and 6–7 mm. broad, shortly stipitate, coriaceous, completely 2-celled, several-seeded, sulcate at both sutures, acute to acuminate, at length incurved, ascending, glabrous.

Specimens of this species were collected in Sutton, Schleicher, Crockett, Irion, Reagan, and Upton counties, the total number of sheets being 152. The TYPE specimen, No. 134, was collected May 5, 1929 from a northern tributary of Bates Draw at a point six miles north of Big Lake in Reagan County, Texas. It is deposited in the herbarium of the Texas Agricultural Experiment Station at College Station, Texas. Authentic material has been deposited in the Gray Herbarium.

This species is related to *A. mollissimus* Torr., with which it agrees in having glabrous fruit but differs in having yellowish-white flowers and the calyx teeth nearly equaling the tube. While these differences are quite distinctive neither species occurs within the range of the other one and, moreover, one grows in sandy soils and the other grows in clayey soils.

DISCUSSION

The new species grows in clayey soils in grass-land along draws and in depressions or lake-beds on the divides, but not in weedy valleys or weedy lake-beds; and it is limited in distribution to the northwestern part of that portion of the Edwards Plateau lying east of the Pecos River. It occurs as far south as 2½ miles below the north line of Sutton County near its northwestern corner, as far east as 3 miles south of Mertzon in Irion County, as far north as the north line of Reagan County, and as far west as 6 miles southwest of Rankin and 6 miles northwest of Upland in Upton County.

Outside of the territory thus outlined a collection of this loco was received from an isolated station about fifteen miles southeast of Sterling City. While this collection was from along the North Concho River the writer was unable to find any loco along this stream or its tributaries in Sterling County. From this station to the south and southwest it is thirty miles or more to the nearest occurrence of loco on the tributaries of the Middle Concho River. This collection was received in the mail after the writer had visited the North Concho River drainage area and had come to the conclusion that the same was free from loco, or otherwise a more inclusive inspection would have been made. As it was, that portion of this area lying northwest of Sterling City was not visited at all. From this circumstance it seems possible that other scattering outposts of this loco may be located in the North Concho River drainage area.

Other species of loco grow both to the west and to the north of this one, but apparently intervening is a wide belt wherein no loco grows. *Astragalus argillophilus* does not extend to the Pecos River, its nearest approach to the same being about twelve miles from it on Five Mile Creek in Upton County; and it has not been reported from the western side of that river, nor does it reach the boundary of the Edwards Plateau and the High Plains. A detailed study of the southern limit of *Astragalus mollissimus*, the loco plant extending furthest south on the High Plains, has not been made, but that species has not been found on the Edwards Plateau.

The species described herewith is definitely known as a loco plant by reason of authenticated instances of horses, cattle, and goats becoming locoed through feeding upon it. It has at no time caused any extensive losses, and those occurring have been confined largely to horses and steers in seasons of short range.

In certain localities much determined effort has been made toward the eradication of this species, but its complete extermination will be long delayed if, indeed, it ever takes place.

Texas Agricultural Experiment Station.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. LXXXVII

I. LIGUSTICUM SCOTHICUM OF THE NORTH ATLANTIC AND OF THE NORTH PACIFIC

M. L. Fernald

(Plates 193 and 194)

The Scotch Lovage, *Ligusticum scothicum* L., is generally treated as having two widely separated areas of distribution, one on the North Atlantic: the coasts of Scandinavia, the British Isles and Iceland at the east and of southern Greenland, Labrador, eastern Canada, New England and southeastern New York at the west; the other on the North Pacific: southern Alaska and Kamtchatka to Japan. The two areas are, obviously, quite isolated; and, whenever I have had for identification material from the North Pacific, I have at first failed to recognize it as *Ligusticum scothicum*, for in its small and compact convex-topped flowering umbels it has always seemed very different from the plant I have intimately known for forty years on the shores from Long Island to Labrador, the latter plant having the primary umbels much broader and flat-topped. From time to time I have undertaken a closer comparison of the plants of these two remote areas but, owing to lack of mature fruit of the plant of the North Pacific, have as regularly abandoned the study. Recently, however, realizing that the great student of the Kamtchatkan flora, Dr. Eric Hultén of the Riksmuseum at Stockholm, must have before him abundant material of both plants, I referred the question to him. My attempt thus to delegate the problem, however, proved a "boomerang"; Dr. Hultén responded by supplying me with excellent fruiting material from Kamtchatka and from Japan, thus encouraging me to look further into the question. The result of this renewed study is the proposal of

Ligusticum **Hultenii**, n. sp. (t.), *L. scothicum* simulans; foliolis

foliorum inferiorum subrotundatis vel late rhomboideis 1–7 cm. longis crenato-dentatis, venulis plerumque confluentibus areolas clausas formantibus; umbellis hemisphaericis ad anthesin convexis primariis 3–5.5(–7) cm. latis; fructu anguste oblongo 8–10 mm. longo 2–2.5 mm. lato.—Alaska and Kamtchatka to Japan. ALASKA: Fort St. Michael, Norton Sound, 1865–66, *H. M. Bannister;* False Pass, Alaska Peninsula, August 3, 1925, *O. J. Murie*, no. 67; Lake Iliamna region, 1902, *Gorman*, no. 114; Ocean Cape, Yakutat Bay, July 18, 1892, *Funston*, no. 70; grassy edge of woods, Prince of Wales Island, August 8, 1915, *Walker*, no. 916a; Sitka, *Mertens;* shore, Sitka, August 8, 1907, *Cowles*, no. 1089; Ilinlink, Unalaska, September, 1871, *M. W. Harrington;* Unalaska, July 25, 1891, *J. M. Macoun;* on moisture-bathed rock or in moist lowlands along streams, Unalaska, July 6, 1907, *Van Dyke*, no. 7; moist places, Makushin Bay, Unalaska, July 14, 1907, *Van Dyke*, no. 169; Amchitka Island, July 25, 1873, *Dall;* Nazan Bay, Atka, July 26, 1907, *Van Dyke*, no. 238 (TYPE in Gray Herb.); Akutan, August 21, 1907, *Van Dyke*, no. 325. KAMTCHATKA: Petropavlovsk, 1853–56, *C. Wright*, August 17, 1920, Hultén, no. 932. JAPAN: Kokodate, 1859, *Wilford*, 1861, *Maximowicz*, July 10, 1890, *Miyabe & Tokubuchi;* Sapporo, July 7, 1903, *Arimoto*.

Named for Dr. Eric Hultén, whose critical studies of the flora of Kamtchatka are clearing the identities of plants of many other sections of the northern hemisphere.

Superficially, *Ligusticum Hultenii* is at once separated from well-developed *L. scothicum* by the smaller and more rounded crenate-dentate leaflets of the lower leaves and the very small and convex umbels. The lower leaves of *L. scothicum* of shores of the North Atlantic have the leaflets usually narrower, more cuneate at base, more cleft and commonly acute to acuminate and more serrate-dentate (though in small northern forms they may be crenate), and the lower leaflets are often 1 (sometimes even 1.5) dm. long; and the primary umbels of *L. scothicum* are broader, in anthesis 4–10 cm. broad and essentially flat on top. The fruit of *E. Hultenii* is slightly but appreciably narrower, the mature merocarps 2–2.5 mm. wide, while in *L. scothicum* they are 2.5–4 mm. broad. Probably the most positive difference in the foliage is found in the venation of the leaflets of the lower leaves: in *L. scothicum* (Plate ——) the larger veinlets are confluent, thus forming areolae, but a large proportion of the ultimate ones have free ends; in *L. Hultenii* (Plate ——) most of the veinlets of the lower leaves are confluent, forming areolae. This difference is clearly brought out in the micro-photographs kindly prepared by Mr. Albert N. Steward.

Photo. by A. N. Steward.

VENATION OF BASAL LEAFLET OF LIGUSTICUM SCOTHICUM
(UPPER FIG. × 3, LOWER FIG. × 20)

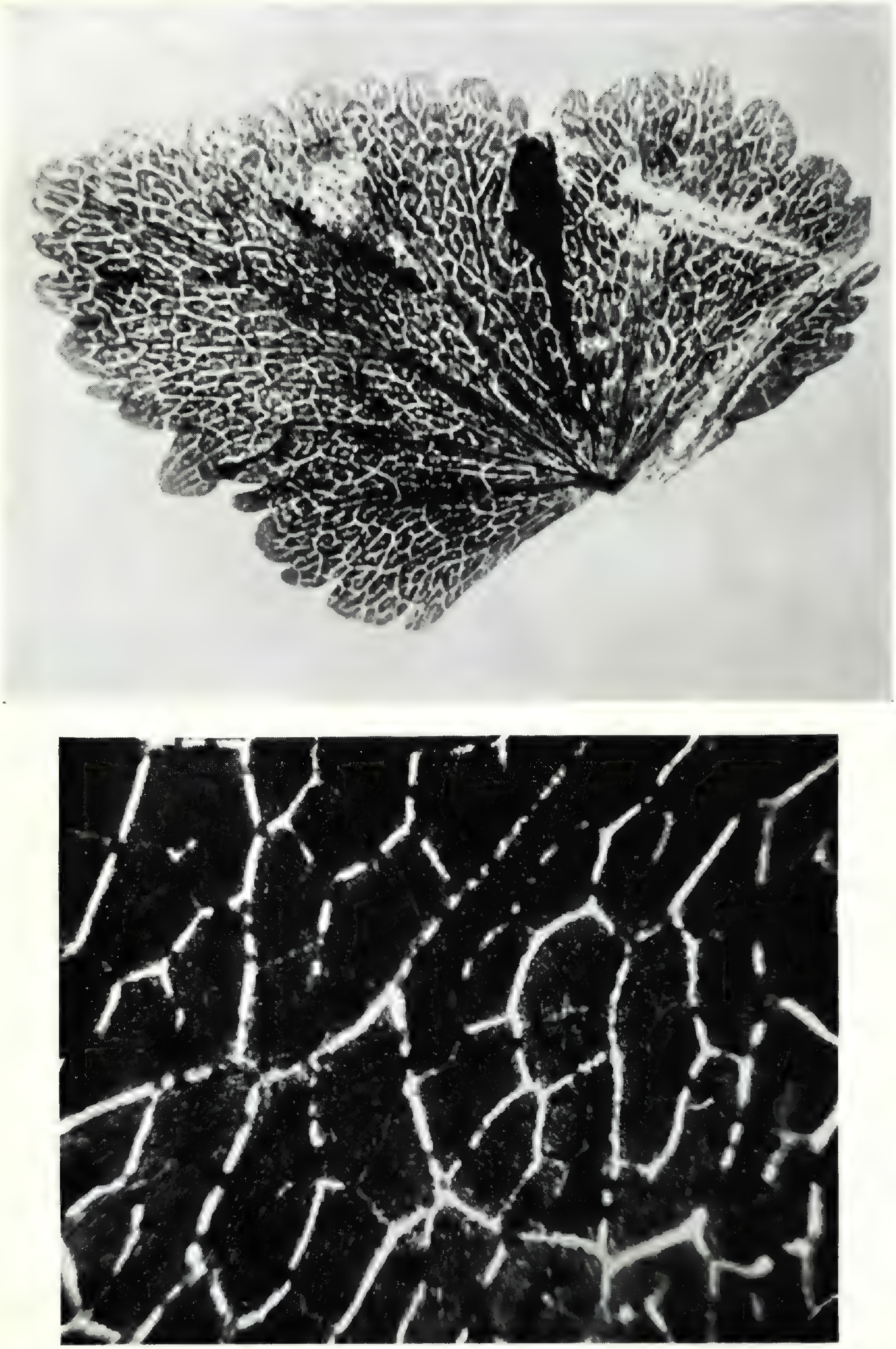

Photo. by A. N. Steward.

VENATION OF BASAL LEAFLET OF LIGUSTICUM HULTENII
(UPPER FIG. × 3, LOWER FIG. × 20)

EXPLANATION OF PLATES 193 and 194

PLATE 193, upper fig., basal leaflet of LIGUSTICUM SCOTHICUM, to show venation, × 3; lower fig., venation × 20. PLATE 194, upper fig., basal leaflet of L. HULTENII, to show venation, × 3; lower fig., venation, × 20.

II. CAREX MACROCEPHALA AND C. ANTHERICOIDES

M. L. FERNALD

DR. Charles W. Townsend sent me in November last a much battered "pocket specimen" of a grass-like plant which he had found "on a sand dune near Seaside Park, near Tom's River, New Jersey," with the additional information that "it was said to have spread rapidly over the dune, and that it was never planted there . . . The care-taker of the property thought it would be an excellent sand binder, which it appears to be, as it makes a close mat." The plant had nearly cylindric culms and no fruit, so, taking it upon casual inspection to be a grass, I sent half the material to Mrs. Agnes Chase for identification. In the absence of Mrs. Chase, the plant was examined by Mr. E. C. Leonard who has correctly identified it as *Carex macrocephala* Willd. of the sandy coast of eastern Asia, from eastern Kamtchatka, Sachalin Island and Japan to Shantung. It is apparently quite at home on the New Jersey sands, for Mr. J. R. Swallen of the Bureau of Plant Industry writes: "This is the second specimen that has been sent in from New Jersey."

Carex macrocephala is generally supposed to occur on the Pacific coast of North America, from southern Alaska to Oregon; but Dr. Townsend's material so closely matches the Asiatic specimens and so far departs from the fine series in the Gray Herbarium from the sands of British Columbia, Washington and Oregon that I have compared the two series with some care. It now becomes clear that the plant of western North America is a thoroughly distinct species, for more than a century wrongly identified with the Asiatic *C. macrocephala*. The American species is C. ANTHERICOIDES Presl., Rel. Haenk. 204 (1828), originally collected at Nootka Sound on Vancouver Island; and it is distinguished from the Asiatic by characters of the rootstock, lowest leaves, rosette-leaves, culm, scales, anthers and achenes. The original description by Willdenow of the Asiatic plant was meagre, but the very complete description of true *C. macrocephala* given by Regel[1] and beautifully illustrated by him may be compared

[1] Regel, Tent. Fl. Ussur. 164, t. xii. figs. 8–12 (1861).

with the equally full original description by Presl of his *C. anthericoides* or the beautiful plate (as *C. macrocephala*) of Francis Boott.[1] The Regel and Presl descriptions and the Regel and Boott plates accurately portray the two species, while Kükenthal's description[2] was based primarily upon Asiatic material and Mackenzie's description and accurate figure of the American plant in Abrams's Illustrated Flora[3] are drawn from American specimens.

The rootstock of *C. macrocephala* soon loses the shredded sheaths, that of *C. anthericoides* retains them tightly investing the internodes. In *C. macrocephala* the leafy shoots have few if any bladeless basal leaves, and the bases of the true foliage-leaves quickly disintegrate into fibres ("Culmi . . . basi fibris foliorum emarcidorum vestiti"—*Regel*); in *C. anthericoides* the basal leaves are reduced, dry and bladeless and they, as well as the long green leaves above them, rarely if ever disintegrate into fibres. In *C. macrocephala* the upper leaf-surface is scarcely ribbed, in *C. anthericoides* prominently so; in *C. macrocephala* the fresh leaf-margins are coarsely (often papillately) toothed ("Folia . . . marginibus grosse serrata"—*Kükenthal*), in *C. anthericoides* the serration is much finer and spinulose ("margins minutely but sharply serrulate"—*Mackenzie*). The culm of *C. macrocephala* is very obtusely angled, almost cylindric, and smooth ("Culmi . . . obtuse triangulares, leaves, glabri"—*Regel;* "Culmus . . . obtusangulus laevis"—*Kükenthal*); the culm of *C. anthericoides* harshly serrate on the sharp angles ("Culmus . . . triqueter striatus angulis serrato-scaber"—*Presl;* "*Culmus* . . . triqueter, scaber"—*Boott;* "Culms . . . often strongly roughened on the angles"—*Mackenzie*). In *C. macrocephala* the scales of the spikes are herbaceous and greenish, with pale firm borders, becoming drab, and they are conspicuously toothed on the margin ("Squamae . . . praecipue apicem versus serrulatae, herbaceae,"—*Regel;* "Squamae . . . in acumen . . . marginibus eroso-denticulatum attenuatae"—*Kükenthal*); in *C. anthericoides* the scales have thin, scarious or hyaline brown sides and, except for the outer bracteal ones, are quite entire ("Glumae . . . dorso nervoso-striatae virescentes, margine fuscae"—*Presl;* "squama . . . ferruginea"—*Boott;* "scales . . . brownish with green center and hyaline margins"—*Mackenzie*), the margins beautifully

[1] Boott, Ill. Carex, i. 27, t. lxix (1858).
[2] Kükenthal in Engler, Pflanzenr. iv[20]. 187 (1909).
[3] Mackenzie in Abrams, Ill. Fl. i. 293, fig. 691 (1923).

shown in the illustrations cited, Regel's fig. 12 of the Asiatic plant showing the characteristically toothed scale, Boott's figs. *c*, *g* and *h* and Mackenzie's figure of the American correctly representing entire scales. The anthers of the Asiatic *C. macrocephala*, as shown by 4 staminate inflorescences before me, are 4.5–6 mm. long; in the American *C. anthericoides*, as shown by Boott's illustration and by several sheets of specimens, only 2–3.3 mm. long. The achene of the Asiatic *C. macrocephala* tapers to the base, that of the American is strongly rounded at both ends, as clearly shown in Boott's figs. *ff*.

Altogether, the specific distinctness of the plants of the two sides of the North Pacific is apparent. Geographically they parallel numerous other cases and it is at least worth noting that true *Carex macrocephala*, now establishing itself on the Atlantic coast of North America comes from the same region as the other sea-shore species, *Artemisia Stelleriana* Besser, which has rapidly fixed itself upon our coastal dunes and beaches. It is also not without interest that the coarse Sand Reed or Psamma of Atlantic America, *Ammophila breviligulata* Fernald[1] should have proved to be specifically quite unlike the European *A. arenaria* (L.) Link; but that the European, rather than the Atlantic American, plant should have made itself at home on the Pacific coast of North America.

(To be continued.)

Dynamic Forces in the Flora of Quebec.[2]—In this interesting address, delivered by Frère Marie-Victorin, as retiring president of the Société Canadienne d'Histoire Naturelle, we have the Quebec Flora viewed as something dynamic, mobile, feeling the surge of life, and the constant impulse to change. The apparent stability of the flora during a period of years, or even a century, cannot hide the fact that all is changing. "Plant associations are living mosaics where slowly, parallel to the physical evolution of the ecologic factors, and often outside of it, substitutions take place. The equilibrium which impresses us by its apparent stability is only an equilibrium of the whole, and not the equilibrium of the parts; it is only a resultant, a product which remains apparently the same during very long periods at least, but the factors of which are subject to perpetual changes of order and importance."

The influences which affect the flora of a region may be classified more or less arbitrarily as intrinsic, those which arise from the possibilities inherent in the plant life itself, and extrinsic, those which arise from

[1] Fernald, Rhodora, xxii. 71 (1920).

[2] *Le Dynamisme dans la Flore du Québec*, par Frère Marie-Victorin. 89 pages, 42 figures, 1929. $1.00. Contributions du Laboratoire de Botanique de L'Université de Montréal, No. 13.

modifications in the external or ecologic conditions under which the plants live.

The forces of evolution have first claim as intrinsic factors. The emphasis in evolutionary studies has been on lines of descent; here it is necessary to take a broader view of the subject, to consider the development of the whole flora. "The view which the flora of our country offers us, and the lessons which may be drawn by studying it attentively, can only strengthen this conviction that vegetable life continues a development begun long since, that it brings forth still more or less rapidly new specific or varietal entities, and that the possibilities of development are by no means exhausted by the actual development of the species and the normal development of the individual."

As examples of *discontinuous* evolution, Brother Victorin cites two species of *Senecio* which show veritable mutations, *S. pauperculus* with its forma *verecundus* Fernald and *S Pseudo-Arnica* and its variation which is here elevated to specific rank as *S. Rollandii*. Both of these are found in abundance, for Brother Victorin usually has "des milliers" of plants before he is willing to venture a new description.

As the next instance of *discontinuous* evolution he cites the involved group *Crataegus*, fifty species of which, several endemic, are known from Quebec. "For the thorns are not forest species; their expansion demands dry places and abundant light. In prehistoric times all Quebec was covered with thick forests, and open places other than marshes and peat-bogs were decidedly rare. The thorns could only establish themselves with difficulty in little isolated groups along the watercourses. It is thus that we see them today at the limits of their distribution, at their vanguard, on the shores of Lake St. John, at Temiscaming and at Anticosti. It seems then that the great development of the genus in America is the immediate result of the break in ecologic equilibrium caused by deforestation. Not that the new environment thus created at once formed new entities in molding them to its conditions. That is an *a priori* concept that everything today forces us to abandon. It seems indeed rather that the species, because of a dynamic force which we still fail to understand, and under the stimulus of environment, produced by chance, in all directions, mutations which have in themselves no connection with either environment or utility."

An excellent map shows the different routes by which the species of *Crataegus* entered Quebec, and distributed themselves in the Province.

Evolution, apparently *continuous*, has produced many floral changes. Conspicuous among these is the differentiation between the gymnosperms of the Cordilleran region and those of eastern America, brought about at the end of the Cretaceous period, when an inland sea occupied the central part of our continent, and continued later by the wide belt of prairies which in the Tertiary took the place of the sea. Accordingly the western pines, fir and larch are parallel to our eastern species, but not identical with them.

Another change was brought about during early Tertiary (période nummulithique) when the North Atlantic land bridge between America and Europe gradually disappeared. Species which we now think of as distinctly American, like *Liriodendron tulipifera, Fraxinus americana, Tsuga canadensis, Sassafras officinale*, and even *Brasenia Schreberi* and *Dulichium arundinaceum*, had flourished in Europe during the early

Tertiary, but now became extinct there. Other plants which persisted gradually became different from their parallel species in America, till *Juniperus communis* is perhaps the only tree left which is approximately the same on both continents. "But the present flora of the Gulf of St. Lawrence contains a small but rather important little flora, the Alpine, Scandinavian or Baltic affinities of which are most startling. Certain elements like *Scirpus alpinus*, *Carex salina*, var. *kattegatensis*, *Polygonum acadiense*, *Carex vesicaria*, var. *Grahami*, have remained unchanged, while others like *Carex Hostiana*, var. *laurentiana*, of Newfoundland and Anticosti, have diverged more or less from the primitive type."

There followed the glacial period with its violent changes, and the milder interglacial epochs. In Quebec the *Ginkgo biloba* became extinct, and also several maples, among them *Acer pleistocenium*, closely parallel with *Acer platanoides* of Europe. During the last interglacial epoch the northern part of our continent seems to have been covered with a flora closely related to the Cordilleran flora of today. Scattered mountain peaks in the Shickshocks of Gaspé and other limited areas in Quebec, as well as much of the mountainous part of western Newfoundland escaped the general glaciation, either as nunataks rising above the level of the ice-sheet, or as lobal areas between diverging branches of the glacier. Numerous Cordilleran species survived in these places, and with the departure of the ice-sheet these spots became centers of endemism. The explorations of Fernald and his associates, as well as those of Brother Victorin and his Quebec botanical friends have made these known to science. Among the endemics which remained near their place of origin may be cited *Myriophyllum magdalenense* of the Magdalen Islands, *Antennaria eucosma* of Newfoundland, *Arnica Griscomi* of the Shickshocks, and *Draba pycnosperma* of Percé.

Other species have left the places where they survived, and spread. Among these may be mentioned *Botrychium minganense*, *Gentiana nesophila* and *Orobanche terrae-novae*. *Streptopus oreopolus* is of special interest, as it has been found on the White Mts., and recently by G. L. Stebbins, on Mt. Katahdin.

Another group of plants which show the dynamic forces still active in the Quebec flora are the estuarine plants investigated by Fassett,[1] especially *Bidens hyperborea* and its numerous variants.

So far the essay has dealt with constructive forces in the flora. "It seems also probable that under the continual influence of external conditions, certain species can retrograde and disappear through degeneration, although the facts are less easy to verify." Several types of the epibiotic Cordilleran group show a very clear retrogressive tendency. In this way may be explained, in reference to their type such variations as *Erigeron lonchophyllus*, var. *laurentiana*, *Draba luteola*, var. *minganensis*, and *Cypripedium passerinum*, var. *minganense*, recent discoveries of Brother Victorin in his summer explorations,[2] as well as other isolated species. "A law of death seems to weight down this Cordilleran group of plants, a law which reduces it to burying itself in protected ravines to escape the final destruction which awaits it. Which is the real cause here, intrinsic insufficiency or external pressure?"

[1] Fassett, N. C., *Bidens hyperborea* and its varieties. Rhodora xxvii, 166–171, 1925.

[2] *Deux Epibiotes remarquables de la Minganie*, par Frère Marie-Victorin. Contributions du Laboratoire de Botanique de l'Université de Montréal. No. 12, 1928.

The intrinsic forces of evolution modify the flora profoundly in time, by modifying the elements of which it is composed. The extrinsic factors work much more quickly, not on the individual plant, but on the expansion of species and their grouping in time and place. Changes of climate and physiographic conditions are of first importance. Thus the mild climate which surrounded the Champlain sea even before all the glaciers had completely melted, may explain the northern extensions of such plants as *Lycopodium tristachyum* and *Solidago puberula* and the genus *Crataegus*.

There is some reason to think that the continental side of the strait of Belle Isle may once have been wooded heavily, though there are different explanations for the presence of large stumps at Blanc Sablon. At any rate there are found in this region, mixed with a strictly boreal flora, such plants as *Botrychium virginianum*, *Milium effusum*, *Carex Deweyana*, *Streptopus amplexifolius*, *Viola Selkirkii* and *Solidago macrophylla*, a group which only needs the spruce forest to be perfectly at home several degrees further south in the St. Lawrence valley, or in the Green Mts. of Vermont. In like manner there is some question as to whether the spruce forest which covers the north shore of Anticosti is not a case of the survival of the *existent*. There is much doubt whether under present climatic conditions such a forest could reëstablish itself in that locality again. Local chilling of the sort which may be indicated here and at Blanc Sablon is, however, probably due to changing currents or something of the sort, and is an episode of no general importance, compared with the great climatic changes known to have occurred in the earth's history.

Human life has also had a tremendous extrinsic influence on our flora, for when man had once begun to domesticate plants, he had to wrest the soil from other species to make room for them. "When the shelter of the cave and the skin tent ceased to be sufficient for him, man with his stone axe attacked the tree, and opened the forest. Then began the deforestation of the planet, the contest of a spiritual factor against the agelong forces of nature. A most violent action of itself, deforestation released a whole series of dynamic reactions among the floras of the world." Important among these is the beneficent change of climate, which has already abated the rigors of such new sections as Abitibi and the region of Lake St. John.

Fire also broke loose as an agent for clearing the land. When left to itself the burnt land by a series of plant successions gradually tends back toward primitive conditions. But where the land is permanently cleared, European plants, mostly annuals, which have crossed the Atlantic with man, become quickly acclimated, "sometimes (as around the city of Quebec) nearly displacing the indigenous plants, and becoming veritable scourges." Other waifs have followed the railways and other routes of travel, some, an increasing number, coming from the west, and at least one, *Galinsoga*, from tropical America.

There have indeed been many changes since the old-time botanists first visited Quebec. "What would the spring be without the resplendent flowering of the dandelions; what would our summer fields be without the starry daisies, the caerulean touch of the chicory, and without the blood-tinged vividness of the orange hawkweed? And how different now are the shores of the St. Lawrence between Montreal and Three Rivers, with the rich mantle which the purple loosestrife gives to the

low islands, and the *Butomus* to the river flats!" This latter is a newcomer which in less than forty years has taken possession. "It is a fine example of the overturn which can be brought about in a flora by a single species, when it is well equipped and leaves its horde of enemies behind as it enters a new territory—a fine illustration of dynamic violence in time and space."

"From this rapid survey, some conclusions stand out, it seems, rather clearly.

"The intrinsic influences, forces of evolution or elimination which have dynamic influence on floras in general, and on the flora of Quebec in particular, are a function of the nature of organic beings, and will continue to work out slowly but relentlessly in the direction of development, or in the direction of retrogression.

"The extrinsic influences, which have to do especially with the intelligent activity of man, and his means of action on nature, are essentially more rapid and brutal. They tend to blend and blur the floras, to lead them to a state of equilibrium quite different from the natural equilibrium. By destroying barriers, by suppressing distances, by setting in motion agents of transportation which upset the agelong balance of the elements of the biosphere, they tend to establish on the planet a certain uniformity which would be a state of equilibrium analogous to that toward which the forces of erosion tend. But these extrinsic forces would gradually lose their intensity in case of the destruction of our civilization and a return to barbarism; they would cease to act with the disappearance of the human race. The old balance ought then to reëstablish itself, in considerable measure. The hordes of plants long held in check by human toil, the plants of prey long treated as enemies, would advance over our fields, would rise to the assault of our cities and towns, would cover the ruins of them with thick masses of vegetation, while above the ashes of the human edifice, in an atmosphere become more pure, above an earth once more silent, would shine again, liberated, wild, yet magnificent, the torch of life."—Clarence H. Knowlton, Hingham, Massachusetts.

A Callitriche new to Massachusetts.—*Callitriche deflexa* A. Br., var. *Austini* (Engelm.) Hegelm. is one of the most obscure flowering plants. Prostrate upon the ground, little branched, with leaves "2–4 mm. long," it looks like nothing at all, or at most like sterile basal shoots which may later grow to be something. This probably accounts for its having been so long overlooked on one of the most frequented trails on Mt. Toby. Here it was first collected by the writer on 27 July 1927. It was seen again in 1928, but not collected again until 10 July 1929, as its rarity was not at first suspected. The identification has been kindly verified by Mr. C. A. Weatherby of the Gray Herbarium, who states that it appears to be the first collection of this species in Massachusetts. The Manual records its range as far north as Connecticut, only. This station is

in the town of Sunderland, Franklin County. There is a considerable quantity of the plant scattered along quite a long strip of old lumber road through the woods.—FRANK C. SEYMOUR, North Amherst, Mass.

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THE NEW ENGLAND BOTANICAL CLUB

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BOTANICAL NOTES FROM NORTHERN VERMONT

Arthur Stanley Pease

From Burke Mountain, near East Burke, Vermont, there is a remarkable view of Willoughby Lake and its enclosing mountains, Hor and Pisgah, and thence, on August 7, 1929, I also observed, about four miles to the east of Mt. Pisgah, a mountain with steep cliffs, facing, not west, like the classic cliffs and talus of Pisgah, but eastward. On inquiry I learned that this mountain was named Bald Mountain and that it lay in the eastern corner of the town of Westmore, and in the hope that so near a neighbor of the Willoughby mountains might itself be not without interest I determined to visit it the next day.

During the same afternoon, as I drove on from Seymour Lake in Morgan through the town of Holland, I stopped at an interesting stretch of road in the latter township and immediately found *Linum catharticum* L., growing in abundance in the ditch and in an adjacent rich clearing. This European species has been reported from various stations along the coast, particularly in Maine, but not hitherto, so far as I am aware, from the interior of New England. Here it appeared thoroughly at home.

After a night spent near Salem Pond in Derby I explored, on August 8, the beach at its northern end, finding a large amount of *Spartina Michauxiana* Hitchc., and, in sandy woods nearby, much *Halenia deflexa* (Sm.) Griseb. (also found later in the day along a wood road in the town of Ferdinand). A pasture near a farmhouse at the lower end of the lake contained conspicuous patches of *Thymus Serpyllum* L., some of them several yards in diameter.

Later that forenoon I drove through the township of Brighton to the most convenient approach to the Bald Mountain cliffs, near Job's pond in the eastern part of Westmore. There I left the road and skirted the pond to the foot of the mountain. A scramble up steep slopes led to slides upon which sprawled *Astragalus Blakei* Eggleston. On reaching the top of the talus (where *Rhus Toxicodendron* L. was abundant) I found the line of cliffs very extensive, probably nearly as far outstretched as those of Mt. Pisgah, though not so lofty, and on the lower parts of the calcareous ledges and the upper and finer portions of the talus was able to gather, in embarrassingly rapid succession, *Cryptogramma Stelleri* (Gmel.) Prantl, *Woodsia glabella* R. Br., *Muhlenbergia racemosa* (Michx.) BSP., a *Calamagrostis* as yet undetermined but near *C. hyperborea* Lange, *Sphenopholis pallens* (Spreng.) Scribn., *Carex scirpoidea* Michx., *C. eburnea* Boott, *Clematis verticillaris* DC., *Draba arabisans* Michx., *Braya humilis* (C. A. Mey.) Robinson, var. *novae-angliae* (Rydb.) Fern., *Saxifraga oppositifolia* L., *Potentilla fruticosa* L., *Rubus odoratus* L., *Rosa blanda* Ait., *Celastrus scandens* L., *Apocynum cannabinum* L., *Asclepias syriaca* L., *Satureja vulgaris* (L.) Fritsch, *Campanula rotundifolia* L., *Lobelia Kalmii* L., *Eupatorium urticaefolium* Reichard, *Artemisia canadensis* Michx., and *Senecio Balsamitae* Muhl. Of most of these specimens have been deposited in the herbarium of the New England Botanical Club, and duplicates of many in that of Amherst College. Further search, especially at a different season, and an examination of the crests of the cliffs (which I did not investigate) might well yield yet others of the characteristic Willoughby rarities.

Amherst College.

Butomus umbellatus at Lake Champlain.—So abundant is the newcomer from Europe, *Butomus umbellatus*, along the shores of the St. Lawrence near Montreal and elsewhere,[1] that I have been expecting to find scattered specimens of it on muddy shores in the northern part of Lake Champlain. Instead of this, however, my first discovery of this interesting plant was more than a hundred miles south of the Canadian border. Here I found it, August 11, 1929, well established and flourishing, on the South Bay of Lake Champlain, in Dresden, New

[1] C. H. Knowlton, Rhodora xxv, 220–221, 1923; Frère Marie-Victorin, Contributions du Laboratoire de Botanique de l'Université de Montréal, No. 13, 83–84, 1929.

York, near the bridge from Whitehall. It was associated here with such plants as *Potentilla Anserina*, *Proserpinaca palustris*, and a ripened sedge of the *Eleocharis palustris* group. As it is fruiting rather heavily in its new home it is more than likely to spread, especially along the marshy rice-meadows of southern Lake Champlain, and ought soon to be reported from Vermont.

This "Flowering Rush" has a large umbel of pink flowers, the three sepals and the three petals veined with darker color. It has six separate carpels, and has no placentae, the seeds being borne directly on the sides of the carpel in large numbers.—Clarence Hinckley Knowlton, Hingham, Massachusetts.

BUTOMUS UMBELLATUS IN THE LAKE CHAMPLAIN BASIN

W. C. Muenscher

While crossing the temporary bridge over South Bay, an arm of the southern part of Lake Champlain, on August 16th, 1929, my attention was attracted by what from a distance appeared to be a large Allium-like plant growing in extensive areas of muddy flats and shallow water along both shores. Upon closer examination the plant proved to be the flowering rush, *Butomus umbellatus* L., of the family *Butomaceae* closely related to the *Alismaceae*. As far as I am aware, this species has been reported in North America only from Canada where it grows over extensive areas in marshes along the St. Lawrence River.

During the latter part of August, while I was engaged in a study of the aquatic vegetation of Lake Champlain as a part of the biological survey of the Lake Champlain watershed conducted by the New York State Conservation Department, I had an opportunity to observe that *Butomus* is very generally distributed in the marshes and shallow water bordering the southern part of Lake Champlain. It was not observed in the northern part of the lake. In Washington county, New York, *Butomus* was observed in the following localities: South Bay, very abundant on clay flats and in water up to one meter deep; Whitehall, along the border of a mill pond and along the Champlain canal from Whitehall northward for about ten miles to the Dresden Narrows in Lake Champlain. In Vermont *Butomus* was observed in Rutland county, along the shore of Lake Champlain northward to the Dresden Narrows, and in Addison county along the outlet of East Creek.

In Europe *Butomus* occurs in marshes and along borders of streams and lakes from Italy northward to Norway. Thomé[1] gives a good colored plate and description of the species. *Butomus* not only produces many seeds but also numerous small cornlike buds are developed on the submerged rhizome. It is, therefore, well adapted for spreading rapidly under favorable conditions.

Knowlton,[2] 1923, in discussing the distribution and rapid spread of *Butomus umbellatus* along the St. Lawrence River, concluded with the following statement: "As it has many seeds it would seem quite possible for it to work gradually up the St. Lawrence and its tributaries, so that some day it may make its appearance by Lake Ontario or Lake Champlain within the limits of the United States." The extent of the area already occupied by *Butomus* in the southern Champlain Valley indicates that probably it became established prior to 1923. It is now one of the dominant species of the marsh and shore vegetation in this region, and in the future it may be expected to appear in similar situations over a wider area.

CORNELL UNIVERSITY.

SOME NEW SPECIES AND VARIETIES FROM OREGON

L. F. HENDERSON

SCIRPUS **malheurensis**, sp. nov. Stems 18–24 dm. high; primary involucral bract slightly exceeding the inflorescence, secondary ones much shorter; spikelets cylindric-ovoid, 8–12 mm. long by 4–5 mm. thick, greenish-brown, 2–4 in the clusters; rays from sessile to 2.5 cm. long; scales much cleft, their edges ciliate with long many-celled hairs; midvein long-excurrent, the tip either included between the long lobes of the scale or rather long-aristate, serrate or hispid with long fang-like brown teeth which are 1-celled and extend, reduced in size, far down the back of the scale; filaments of the 3 stamens strap-shaped; bristles 6, slightly longer or shorter than the akene, retrorsely barbellate to near the base; style 2-cleft; akene 2–2.5 mm. long, 1.25–1.5 mm. wide, obovate, plano-convex and often angled on the back, generally light-olivaceous, strongly mucronate, finely pitted under high magnification.—In water or on wet shores of Malheur Lake, Harney County, OREGON, July 15, 1927. My no. 8655.

Close to *Scirpus acutus* Muhl., but differing in having the involucral

[1] Thomé, Flora von Deutschland 1: p. 84. 1886.

[2] Knowlton, Clarence H. *Butomus umbellatus* on the St. Lawrence River. RHODORA 25: 220–221. 1923.

bract longer than the inflorescence; the scales nearly round and much-cleft; the long hairs on the edge of the scales; the remarkable dark teeth or papillae on the back of the scale and on the long-exserted midrib.

Scirpus Congdoni, Britton, var. **minor**, var. nov. Differs from the typical form of the species in lower stature, at most 28–35 cm. high; shorter rays; stem leaf-bearing at middle; lower leaves only 1 dm. long or less; short scales merely acute to short-acuminate.—Collected by me along a creek, Mackenzie Pass, Oregon, my no. 7108; also by *Lyle Wynd* at Pole Bridge Creek, Crater Lake Park. His no. 1769.

Juncus (§Nodosi) **inventus**, sp. nov. Stems 3–6 dm. high, arising singly from somewhat enlarged nodes of a very long rootstock; basal leaves longer than or shorter than the stem, stiff, terete as are those of the stem; stem-leaves erect, the upper internode of the stem diverging strongly from the leaves; heads few in a rather dense cluster, brown, 8–12 mm. in diameter; perianth 4–5 mm. long, its outer segments slightly longer and more subulate than the inner; stamens 6, half the length of the perianth, anthers slightly longer than the filaments; capsule *oval to ovate*, but sloping gradually to an apiculation 1–1.5 mm. long, 3-sided, 1-celled; seeds yellow, either acute or truncate, with a white apiculate tip, reticulate with 20–30 longitudinal lines and cross-lined areolae.—Moist, sandy shores of Siltcoos Lake, 2 miles from the ocean, Lane County, Oregon. My no. 6091.

I first named this plant for the lake where it was found and made a few distributions under that unpublished name, but I am now convinced that this plant occurs in other spots in sand along the Pacific, hence the change in name. *Juncus inventus* is related to *J. nodosus* L., more nearly to *J. Torreyi*, Coville. It were better, it seems to me, to put these all together as varieties of *J. nodosus*, but since *J. Torreyi* has been cut off, we must recognize this species, as there is more difference between this and either *J. nodosus* or *J. Torreyi* than there is between those two species. This differs from *J. Torreyi* in darker heads; strongly divergent upper joint of stem; wider, less subulate capsule; and nearly equal perianth-segments, the outer slightly longer and more apiculate, and all noticeably scarious-edged.

Damasonium californicum, var. **Biddlei**, var. nov. Differs from typical *D. californicum*, Torr. in narrower leaves, most of them long, narrow phyllodes; petals more deeply dentate and with more teeth; and rather more akenes.—Common in ditches, in water or mud, near Burns, Harney County, Oregon, June 23, 1927. My no. 8256.

Dedicated to the memory of the late Henry J. Biddle, an amateur botanist of Portland and a most helpful friend.

Allium Geyeri, Wats., var. **graniferum**, var. nov. Differs from the ordinary form of northern Idaho in having numerous bulblets amongst the flowers or entirely taking their places.—Moist to wet natural meadows, Austin Ranch, near Austin, Grant County, Oregon, my no. 5397, also *Cusick*, no. 1827.

The spathe is often 3-valved, sometimes 2-valved. Though the crests are lower than in the typical form of the species, I can find no good specific characters to separate them.

Allium **Robinsonii**, sp. nov. Bulb ovoid, large for the size of the plant, devoid of special reticulation; stem slender, ⅔ under ground, slightly 2-edged, 3–7 cm. long; leaves much exceeding the stem, arcuate, 1.5–2 mm. wide; bracts 2, ovate, abruptly acute, rose-purple; flowers few, 5–12, 7–9 mm. long: pedicels slightly shorter; perianth-segments white to light-pink, with red midvein, obtuse, oblong; stamens ½ to ⅓ the length of the segments; ovary distinctly crested; style shorter than the stamens or about equaling them; filaments rather coarsely confluent.—Gravel and drifting sand, confluence of John Day River with the Columbia, Oregon. My no. 5110.

Differs from the related *Allium Brandegei* in crested ovary, obtuse segments of corolla, and larger bulbs, with no special reticulation; from *A. parvum*, Kell. in its 2-edged stem, narrower leaves and conspicuously crested ovary. I take pleasure in dedicating this pretty species to Dr. B. L. Robinson of the Gray Herbarium, to whom I am under many obligations for past courtesies.

Allium **mirabile**, sp. nov. Plant 15–20 cm. high, very slender and sinuous, with central bulb generally wanting, but with 1, mainly 2, oblong, tuber-like, strongly divaricate bulbs at base, with many filiform root-fibres from the base of the stem; leaves filiform, 2–3, shorter than the stem; bract one, often 2-lobed, ovate, very thin, abruptly acuminate; umbel 7–12-flowered; flowers on slender pedicels (7–12 mm. long), white to light-pink; segments 10–12 mm. long, narrowly lingulate, but involute and appearing acuminate; stamens half as long as the segments, slender, with small cordate-sagittate, sharply pointed anthers; filaments dilated at base and united into a scalloped ring; ovary blunt and crestless, ripening only 1 or 2 seeds.—Dry, shady fir woods in loose, rocky soil, Eight Dollar Mt., near Selma, Josephine County, Oregon, June 17, 1926. My no. 6098.

Allium mirabile greatly resembles *A. Bolanderi*, they agreeing in the peculiar bulbs and serrate inner perianth-segments. But, while the perianth-segments in true *A. Bolanderi*, according to an examination at the Gray Herbarium, are *acuminate*, they are never so in *A. mirabile*, but lingulate and obtuse or at most acutish; the leaves are only 0.5 mm. wide in this species, wider in *A. Bolanderi;* the bract is

single, at most 2-parted, broadly ovate and apiculate; stamens nearer ⅓ than ½ the length of the perianth; filaments dilated at base. From an examination of *A. Bolanderi*, made for me at the Gray Herbarium, I am informed that "the outer bulb-coats in *A. Bolanderi* are rather thick and firm; in your plants they are very thin, and, when wet, become flaccid."

Allium **punctum**, sp. nov. Plant 6–9 cm. high, slender; leaves 2, slightly to strongly falcate, 2–3 mm. wide, slightly to much exceeding the stem and closely investing it to about its middle, where they widely diverge; bulb ovoid, 1.5–2 cm. long; outer coats of bulb very dark, central yellowish-gray, inner white, some of the central coats with oblong-hexagonal cells marked all over their faces and walls with minute indentations as if made by the point of a pin; bracts 2, abruptly acuminate or acute, 0.66–1 cm. long, colored like the perianth; flowers 12–16, on pedicels about 1 cm. long, dark wine-color to nearly black-purple; perianth-segments 8–10 mm. long, oblong, rounded to acutish at apex; stamens ⅔ the length of the perianth, filaments thick-subulate at base and united into a scalloped ring; crests of ovary 3, wide and mountain-like, slightly retuse at apex, white.—In moist, or later dry, rocky flats, near the Donner-and-Blitzen River, 8 to 10 miles north of Frenchglen, Harney County, Oregon, May 20, 1927. My no. 8813.

The beautifully punctate middle coats of the bulb account for the name.

Iris **innominata**, sp. nov. Plant about 30 cm. high or less, from a slender ascending rootstock 3–4 mm. in diameter; leaves abundant, dark-green above, lighter below, violet-purple or green at base, 2–3 mm. wide, ordinarily with revolute margins, longer or shorter than the stems, the apex narrowly pointed; bracts or stem-leaves 2 or 3, their clasping bases 4–9 cm. long, the free portion 1.5–3 cm. long; bracts subtending the flowers about 4 cm. long, nearly equal, green, broadly lanceolate to ovate when opened, scarious at edges; flowers generally 2, on pedicels 5–10 mm. long; flower-tube 2–3 cm. long, almost filiform, the whole flower brilliant dark-yellow, with delicate purple lines on the sepals; sepals oblanceolate, about 4.5 cm. long above the short throat, very narrow at base; petals slightly shorter, lighter yellow and without purple lines, narrowly oblanceolate to elliptic, entire; capsule oblong to oval, 2–3 cm. long; seeds 3 mm. long, nearly round in outline, strongly angled, their sides vermiformly marked.—Dry, sunny woods, Rogue River, about 8 miles above the ferry at Wedderburn, Curry County, Oregon, *fl.* May 23, *fr.* July 14, 1929. My no. 10,086.

Differs from *Iris Purdyi*, Eastwood in dark-green leaves only 2 mm. wide; lower bracts or stem-leaves not overlapping, their sheathing

bases not inflated; flower-bracts shorter; sepals shorter, as is the perianth-tube; capsule obtuse at base. From *I. californica* it differs in narrower, darker leaves; stem-leaves more sheathing; shorter and less acuminate bracts; and much shorter perianth-tube. The color of the flower is exactly that of *I. bracteata*, or even darker. *I. Douglasiana* was in places up the Rogue River, associated with *I. innominata*, and wherever this was the case it had much more yellow than usual, showing the beginnings of hybridization.

Montia **Sweetseri**, sp. nov. Plant procumbent to accumbent, with numerous stems diminishing in size to a flagellate tip and strongly resembling those of *M. parvifolia*, all from an exposed rootstock or caudex 1–10 cm. long and 4–6 mm. thick; radical leaves round to ovate, 3–4 cm. long including the petiole (2–3 cm.); stem-leaves of the same shape but on short petioles, the smallest only 3–4 mm. long; flowers pink, on pedicels about 1 cm. long, these lengthening in fruit to even 2 cm.; sepals round, 3–4 mm. long, greenish-pink; petals oblanceolate, emarginate, mostly about 14 mm. long; seeds slightly pitted, shining, 1.5 mm. in length, 1 mm. in width.—Discovered by *Prof.* and *Mrs. A. R. Sweetser* of the University of Oregon, on exposed rocks and earth at the base of Humbug Mountain, which overlooks the ocean at Brush Creek, Curry County, Oregon, May 30, 1929, later by myself, and in fruit in July. My no. 10,193.

In many ways this plant superficially resembles *Montia parvifolia*, but it differs in every character: size and length of rootstock, size of leaves, shape of cauline leaves, greater size of flowers, and larger seeds, those of *M. parvifolia* never being over 1 mm. long; and to show that this is not merely size due to location I may say that *M. parvifolia* was collected by me north, east and south of this spot.

Silene **insectivora**, sp. nov. Plant 6–18 cm. tall, very glandular from top to bottom; lower leaves from 4–18 cm. long, those of the lower part of the stem much longer than the radical, from obovate-spatulate to linear-oblanceolate, obtuse to acute; upper leaves decreasing rapidly to bracts, 1–2 cm. long at summit; peduncles branching, 1–3 cm. long; pedicels long, erect to nodding; flowering calyx oblong, 15–20 mm. long by 6 mm. wide in center, its lobes narrowly triangular to lingulate, often over ⅓ the length of the tube, not ciliate but with abundant long glands; petals ¼ longer than the calyx, narrowly cuneate, the claw somewhat lacerate above, the blade divided into 2 foot-like parts; appendages narrowly lanceolate, acute; stamens slightly shorter than the styles; ovary oblong, with styles about ½ the length of the petals; ripened capsules and seeds unknown.—Collected by *L. Constance*, student at the University of Oregon, in meadows of Sprague River, Klamath County, Oregon, June 28, 1928. My no. 9427.

This plant is related to *Silene Scouleri* and *S. Hallii*, but differs from both in general appearance, long peduncles and pedicels, stems and foliage so glandular as to be covered from top to bottom with small insects, very long calyx-lobes, oblique foot-like lobes to corolla, and lanceolate acute appendages.

SILENE MONTANA Wats., var. **viscida**, var. nov. Agreeing with Watson's description of *S. montana*, save that the whole plant, instead of being finely pubescent, is finely glandular from top to bottom. —Collected by *Lyle Wynd*, student at the University of Oregon, in dry woods, Crater Lake Park, OREGON, in High Canadian Zone, July 27, 1928. His no. 2357.

RANUNCULUS OCCIDENTALIS, var. **dissectus**, var. nov. This plant, from its pubescence and long, hooked akenes, belongs with *R. occidentalis*, but in its deeply cleft to divided radical leaves it looks, at first view, like some form of *R. orthorynchus*.—Dry slopes of Crater Lake Park, OREGON, near Pole Creek Bridge, where collected by *Lyle Wynd*, July 12, 1928. His no. 2221. It was also collected by *Wm. C. Cusick* in Summit Prairie (no. 2643), later by *L. E. Dethling*, of the University of Oregon, on moist banks of Upper Paulina Creek, Paulina Mts., Oregon (no. 77).

CARDAMINE **Pattersoni**, sp. nov. Plant annual, 11–12 cm. high, much branched from the base or near it, so as to be 7–9 cm. wide at top; whole plant glabrous, or at most puberulent at base; leaves with 3–5 round to obovate leaflets 3–4 mm. long, the terminal leaflet often slightly undulate; pedicels becoming thick and lengthening in fruit, about 5–6 mm. long in flower, 15–20 mm. in fruit; rachis rather zigzag; sepals colored, 2 mm. long, ovate; corolla dark-pink or rose; petals 6 mm. long, obovate, retuse; capsule including style 24 mm. long, style about 3 mm., capsule 1.5 mm. wide; seeds yellowish-brown, 1 mm. wide by 1.25 mm. long; cotyledons accumbent, radicle very noticeable.—Discovered by *Rollo Patterson*, student at the University of Oregon, on moist, mossy cliffs of Saddle Mt., Clatsop County, OREGON, at about 2800 feet elevation, June 10, 1928. No. 22 of his Saddle Mountain collection.

Only two specimens of this pretty little plant were collected, but fortunately both were in flower and ripe fruit. This plant is so unique that no other comes very near it, at least in the Western United States.

ARABIS **Wyndii**, sp. nov. Plant about 4 dm. high, branching at base; leaves and lowest part of stem with abundant forked hairs, most of the stem and upper surfaces of leaves mainly glabrous; leaves crowded at base, oblanceolate, entire, 1–2 cm. long, strongly ciliate with forked hairs, mainly glabrous above, hairy below; stem-leaves 8–12 mm. long, mainly lacking auricles, linear; raceme rather many-fruited, flowers as yet unknown; mature pedicels reflexed, glabrous, slender, 3–6 mm. long; capsules 5–8 cm. long, 1.5–2 mm.

wide, straight or slightly arcuate, the point 1–3 mm. long, style and stigma very short, valves nerved at base ⅓ their length; seeds more or less 2-rowed, orbicular, narrow-winged, 1.5 mm. wide.—Collected by *Lyle Wynd*, student at the University of Oregon, in Crater Lake Park, OREGON. Wynd's no. 2322.

This plant appears to belong with *A. pulchra*, Jones, but differs in its furcate hairs toward the base of the plant; glabrous upper stem and leaves, the latter with ciliate edges; and glabrous capsules.

THERMOPSIS **subglabra**, sp. nov. Plant 9–10 dm. high, entirely glabrous save the calyx, edges of bracts and back of suture of pod, which are appressed-pubescent; stipules about 4 cm. long, oval to ovate, apiculate to obtuse, more than 2 cm. wide; petioles slender, 3–4 cm. long; leaflets oblanceolate to obovate on the same plant, 3–5 cm. long, 1–2.5 cm. wide; flowers 10–13, about 2 cm. long, on slender, glabrous pedicels 5–10 mm. long; bracts ciliate, oblong to ovate, 6–8 mm. long; calyx appressed-pubescent to slightly villous, nearly regular, campanulate, with ovate nearly equal teeth; corolla with banner much shorter than the wings and keel; young legume glabrous save the upper edge, which is appressed-ciliate; mature fruit unknown from this locality. (An unnamed specimen in fruit, *John R. Leiberg*, no. 4195, "from grassy slopes of Umpqua-Rogue River Divide, near Head of Elk Creek" is undoubtedly the same, as it is equally glabrous on fruit and all other places save the calyx).—Shady woods of Culp Creek, near base of Bohemia Mt. Divide, between Lane and Douglas Counties, OREGON. First collected by *Rollo Patterson;* afterward by myself. My no. 9959.

Close to Howell's *Thermopsis gracilis*, but of larger size and lacking its abundant pubescence.

COTYLEDON **glandulifera**, sp. nov. Plant erect, 22–27 cm. high, from a cluster of spatulate leaves at the summit of the rather bare, thick, long rootstocks (6–8 mm. thick); whole plant, save flowers of a decided red-purple; lower ⅔ of stem bare, upper ⅓ glandular and thickly clad with reddish, glandular-ciliate oblong bracts; flowers greenish-yellow, 12–14 mm. long; calyx-lobes ovate, very acute, 5 mm. long, glandular-ciliate and slightly united; stamens slightly longer than the calyx, with oblong anthers, filaments triangular-subulate; carpels nearly erect, slightly united at base, finely papillate, 10 mm. long, reddish; pedicels shorter than the corollas, rather thick, glandular-pubescent; seeds many, narrowly oblong-lanceolate, striate and cross-barred.—Discovered by *Mr. and Mrs. J. R. Leach* of Portland, Oregon, June 1, 1928, along the trail down the Rogue River, 3 miles below Alameda, Josephine County, OREGON. Their no. 1599.

The discoverers say of it: "The whole plant strikes your eye at some distance by its red color."

DODECATHEON **poeticum**, sp. nov. Stem eventually 22–30 cm. high, glandular-puberulent its whole length, the base swollen and bearing many descending delicate fibrous roots; leaves obovate to oblanceolate, obtuse to apiculate, the blade 5–12 cm. long, petioles from as long as to ⅓ as long; flowers 1–10, on pedicels 1–4 cm. long; calyx-lobes ovate-lanceolate, slightly shorter than the ripe capsule; corolla with slightly yellow circle at base, then a crimson, crenate narrow band, next a broad yellow band, then the main rose-pink outer portions; stamineal tube generally black, sometimes with some yellow, half as long as the 5 anthers; capsule ovoid, 4–7 mm. long, opening generally through the teeth.—Bluffs of the Columbia River, near the east line of Hood River County, OREGON, April 2, 1924, *fruit* May 13. My no. 503 of the 1924 collection.

I wrote up this species in 1924 and submitted flowers and fruit to the late Prof. C. V. Piper at Washington. He thought it a good species and advised publication. I hesitated at that time to add to the flood of new species of *Dodecatheon*, and laid it by. Last year I sent it to Prof. Morton E. Peck, studying at the Gray Herbarium, and he agreed with Piper that it is an undescribed species, differing, at any rate, from anything in the Gray Herbarium. Since the crimson ring on the flower so simulates in miniature that of *Narcissus poeticus* I have given it this specific name.

SYNTHYRIS ROTUNDIFOLIA, var. **Sweetseri**, var. nov. Differs from the typical form of the species only in remarkably long, rather than round, and more incised leaves; larger stature and bluer flowers. —Collected by *Prof. A. R. Sweetser*, Head of the Department of Botany at the University of Oregon, as well as by myself, on shady bluffs of Slate Creek, Redwood Highway, Josephine County, OREGON, March 22, 1925; subsequently found in many places. My no. 5860.

ARTEMISIA DISCOLOR, var. **glandulifera**, var. nov. Differs from the typical form of the species in not being tomentose below, but very glandular; the flowers also conspicuously glandular and giving off a delicious aroma.—Growing on the edge of a cold stream, dropping from the subalpine heights of Eastern Stein's Mts., beyond Alvord Ranch, Harney County, OREGON, July 2, 1927. My no. 8489.

CHRYSOTHAMNUS BLOOMERI (Gray) Greene, var. **pubescens**, var. nov. Differs from the typical form of the species in being pubescent, or among the heads slightly tomentose.—Sent to us from open Fremont Valley, northern Lake County, OREGON, by *Mrs. Alvin S. Hawk*. No. 11455 of the University of Oregon Herbarium.

HIERACIUM CYNOGLOSSOIDES, Arv., var. **ursinum**, var. nov. Differs from the typical form of the species, which is always glabrous above to but slightly pubescent, in being covered nearly to the base with black, glandular hairs, giving it a resemblance to a bear's coat.—Amongst yellow pines, on serpentine outcrops, 2 miles west of Roose-

velt Highway at Carpenterville, Curry County, OREGON, July 14, 1929. My no. 11426.

LUINA HYPOLEUCA Benth., var. **dentata**, var. nov. Differs from the typical form of the species in its strongly dentate leaves, their upper surfaces apparently always tomentose or floccose; flowers 14–15 mm. long.—Rocky bed and banks of the South Coquille River, at the bridge below Powers, Coos County, OREGON, July 17, 1929. My no. 11431.

SOLIDAGO CALIFORNICA, var. **aperta**, var. nov. Like the typical form of the species, as it exists around Grant's Pass, OREGON, but with the clusters of the panicle from contiguous to 3 cm. apart.—Dry, exposed hillside, 15 miles down the Illinois River, below Selma, Josephine County, OREGON, June 18, 1926. My no. 7073.

All types of these plants are in the herbarium of the University of Oregon. Many of the collectors not having used numbers, I have in such cases used my own.

UNIVERSITY OF OREGON,
Eugene, Oregon.

SOME RARE INTRODUCTIONS NEAR HARRISBURG, PENNSYLVANIA.—While botanizing in an abandoned field near Harrisburg, Pennsylvania I found a large colony of *Thlaspi perfoliatum* L. According to records available only two stations of this plant have been reported on this side of the Atlantic, one at Hamilton, Ontario and another at Geneva, New York. The colony was located on a shale hillside, together with *Viola arvensis*, *Silene latifolia*, *Lychnis alba* and *Lepidium campestre*. In the same locality I found *Thlaspi arvense* L. which is not uncommon in this section.

Another interesting find was an extensive colony of *Cynanchum nigrum* (L.) Pers. This colony was located in the South Mountain, three miles from Marsh Run, York County, Pennsylvania. There is no record of this plant from this State, except in the vicinity of Philadelphia. Both of these plants are of European origin, and it would be interesting to know how they became established in central Pennsylvania.—H. A. WARD, Harrisburg, Pennsylvania.

A NEW LEPIDIUM FROM NORTH CHINA

ARTHUR PAUL JACOT

Lepidium apetalum was described by Willdenow from a single maimed specimen from Siberia. He states that the leaves are

lanceolate-linear, entire, sessile and that the stems are procumbent, ascendant at tips.

Busch (1913, in: Flora Sibiriae et Orientis Extremi, part 25, Cruciferae, pp. 90–93) redescribes and figures what *he* calls *L. apetalum*. This species is not procumbent but somewhat lax, the leaves with a tooth on each side near the apex. The description, however, calls for basal leaves which are considerably cut. This is not, therefore, *L. apetalum* of Willdenow but seems identical with *L. micranthum* Ledeb. Note the distribution on page 93 in two distinct bands across eastern Asia separated by Manchuria and Mongolia.

Thellung in his monograph (Die Gattung Lepidium (L.) R. Br.; 1906) describes *L. apetalum* as having leaves auriculate, semiamplexicaul, rarely somewhat attenuate and approaching lanceolate, and the base of capsule attenuate, acutish. This again is another species.

We are thus faced with the fact that *L. apetalum*, which is chiefly self-fertilized, is a group of species.

The species common about the alkaline, semiarid plain of north China (and as represented about Tsinan) is distinct from the Siberian forms. It may be known and characterized as follows:

Lepidium **chitungense** sp. nov. Annual; spreading, low, rarely exceeding 10 inches in height, branches springing from close to ground, spreading, stiff, making a broad angle with axis, sometimes nearly a right angle, covered with short, clavate pubescence; leaves linear-oblong, sometimes lowest leaves narrower towards base, always broadening to a clasping sometimes semiauriculate base, the basal leaves with remote, blunt teeth, the upper similar but the teeth more slender, or with only one or two teeth near apex or none (i. e. strap-shaped), glabrous or sparsely clavate-pubescent on veins and margins; flowers apetalous (?), with 2 stamens; sepals white-margined especially at apex, center of disc of inner and outer ones often barbulate; mature capsule elliptic-ovate, emarginate at apex, with a narrow wing above. —Types: In the Gray Herbarium and the herbarium of the Shantung Christian University.

Thus the flowers and fruits are identical with those of *L. ruderale* with which *L. chitungense* is now found intermingled on the University campus, though five years ago it was alone. It differs strikingly in its low, spreading habit of branching, in its leaves which are never more than toothed, while in *L. ruderale* they are lyrate, the teeth *always* simple, and in the clavate pubescence (showing it to belong to the *apetalum* group).

My thanks are due to F. Gagnepain of the Paris Herbarium, M. L.

Fernald of the Gray Herbarium and members of the staff of the Kew Gardens for aid in this study.

SHANTUNG CHRISTIAN UNIVERSITY,
Tsinan, Shantung, China.

WHAT IS SCIRPUS GLAUCESCENS WILLD.?

OLIVER ATKINS FARWELL

WILLDENOW's description is as follows:

*3. SCIRPUS *glaucescens.*
S. culmo compresso glaucescente, vaginis truncatis, spica solitaria lanceolata, squamis ovatis, radice repente.
Habitat in America *boreali* ♃ D.
Radix perennis repens. *Culmus* sesquipedalis et ultra glauco-virescens compressus. *Vaginae* ad culmi basin truncatae muticae laxae. *Spica* lanceolata vix semipollicaris. *Squamae* ovatae superiores ovato-lanceolatae obtusiusculae, margine membranaceae. *Stamina* tria. *Stylus* trifidus. *Semen* obovatum apice tuberculatum. *Setae* longitudine seminis.

It would be a difficult matter to draw a better description than the above of the plant now passing as *Eleocharis acuminata* (Muhl.) Nees. It cannot be *E. palustris* (L.) R. & S., because that species is not known to have three styles; if *E. palustris* in any of its variations has three styles, I have been so unfortunate as not to have had any such pass under my observation. Three-styled plants should be excluded from the two-styled *Eleocharis palustris.* Fernald and Brackett, in this journal for April, 1929, have monographed the group *Palustres* of the genus *Eleocharis,* and have recognized eight species and two varieties. They give an extended discussion of this species, but, presumably, call it a small form of *E. palustris,* mainly because A. Gray identified the plant in the Willdenowian herbarium as *E. palustris.* Since A. Gray identified the Willd. Herb. plant as *E. palustris,* it is to be supposed that it must be two-styled, and therefore not the plant Willdenow described as *Scirpus glaucescens,* which had three styles. If the Willd. Herb. plant has three styles, then A. Gray misidentified it, and it is not *E. palustris.* Someone who has access to the plant may determine the number of styles in order to prove whether or not it is *E. palustris.* Willdenow's description, with the exception perhaps of the "*glauco-virescens*" character is quite applicable to *E. acuminata,* and his characters of *three styles* and *compressed stems* clinch the identity. No other species of the

genus known to me so well fills the bill; certainly not the plants in America masquerading as *E. glaucescens*, for they have two stigmas and the stems are not compressed.

My conclusion is that *Scirpus glaucescens* Willd. ex descr. (non herb?) or ELEOCHARIS GLAUCESCENS (Willd.) Schultes is *E. acuminata* (Muhl.) Nees (*E. compressa* Sulliv.).

PARKE, DAVIS & CO., Detroit, Mich.

WILLDENOW'S TYPE OF SCIRPUS GLAUCESCENS

M. L. FERNALD

WHEN Miss Brackett and I pointed out[1] that *Eleocharis glaucescens* (Willd.) Schultes had long been misunderstood in this country, we emphasized the fact that it was described by Willdenow as having 3 style-branches. We also published Gray's manuscript memorandum made upon studying the Willdenow type: "*glaucescens*! (spec. cult. but very poor) nothing to do with *S. tenuis*, but certainly *S. palustris*!" But we did not accept this identification primarily upon the authority of Gray, as might be inferred from Mr. Farwell's statement in the preceding article. Ascherson & Graebner, who certainly were so situated as to know what Willdenow had before him but who surely did not know of Gray's unpublished memorandum, had reached the same conclusion;[2] so had Richter,[3] Rouy,[4] Hegi,[5] and various other competent European students. In order again to determine what Willdenow had, Mr. J. F. Macbride, of the Field Museum, when studying type-specimens at the Botanisches Museum at Berlin-Dahlem, was asked to examine the specimen. His reply follows:

"As the Willdenow specimen is very meager, so that I dared not disturb one of the two heads, I asked Dr. Mattfeld (Curator of the *Cyperaceae* here) to confirm my observation regarding the number of style-branches. There are two styles visible and these appear to be unbroken and certainly to have only *two* branches! The specimen had been cultivated in the Garden and Dr. Mattfeld suggests that owing to the spiral arrangement of the flowers Willdenow may have seen seemingly three style-branches as this can be a mistake easy to make from fresh material when one may overtop or overlie another."

[1] RHODORA, xxxi. 61, 74 (1929).
[2] Aschers. & Graebn. Synop. Mitteleurop. Fl. ii². 291 (1903).
[3] Richter, Pl. Europ. i. 142 (1890).
[4] Rouy, Fl. de France, xiii. 361 (1912).
[5] Hegi, Ill. Fl. Mittel.-Eur. ii. 38 (1909).

The identity of the Willdenow specimen need scarcely be further doubted; and certainly it has not been uncommon for technical and comparatively insignificant plants to be misdescribed. Witness Linnaeus's description of *Scirpus geniculatus*, Sp. Pl. i. 48 (1753), "spica subglobosa," for a plant with an elongate-lanceolate or slenderly cylindric spike. Mr. Farwell finds Willdenow's description "quite applicable to *E. acuminata*," except for the character "*Culmus* . . . glauco-virescens." How about the "*Squamae* . . . superiores . . . obtusiusculae"? Muhlenburg's original description of *Scirpus acuminatus* said "squama . . . *acuminata*,"[1] from which character he obviously derived the specific name; and Britton, who for decades has studied the group, says "scales . . . acute or the lower obtusish."[2] Even if it be argued that the usually careful Willdenow described a plant different from the one preserved by him, it would be at least unfortunate to displace an established name by one about which there is obviously great doubt.

GRAY HERBARIUM.

NEW FORMS AND VARIETIES OF INDIANA PLANTS

PAUL C. STANDLEY

DURING the summer of 1929 there have been observed in and near the Indiana dunes, at the southern end of Lake Michigan, several color forms of plants which are worthy of record. These and two new varieties of *Coreopsis tripteris* are described and named below.

TRADESCANTIA REFLEXA Raf., f. **Mariae**, f. nov.—Petala prope basin alba, undique prope marginem lilacina.—This distinct color form of our common spiderwort was collected near Fowler, INDIANA, in the summer of 1929, and the plants are now growing in the Dune Forest Wild Flower Garden near Chesteton, Indiana.

Specimens have not been preserved for the herbarium, because the petals of *Tradescantia* deliquesce in drying so that it would be impossible to preserve their coloring. The form is named for Miss Mary Bremer, who obtained the plants.

TRADESCANTIA REFLEXA Raf., f. **Lesteri**, f. nov.—Petala intense coccineo-purpurea.—Collected near Tremont, Porter County, INDIANA, in the summer of 1929 by Mr. Lester A. Beatty.

The plants have been transplanted to the Dune Forest Garden

[1] Muhl. Gram. 27 (1817).
[2] Britton in Britton & Brown, Ill. Fl. ed. 2, i. 318 (1913).

where they have continued flowering. The petals are of a bright poppy-red color, which is very beautiful, and quite distinct from the normal purple-blue of this species.

ASCLEPIAS TUBEROSA L., f. LUTEA Clute.—This handsome variant of the orange-flowered butterfly weed is rather frequent in the region of the sand dunes about the southern end of Lake Michigan in northwestern Indiana. The flowers in this species exhibit striking variations in color, most of which are scarcely worthy of nomenclatural recognition. The following form, however, apparently of rare occurrence, is easily distinguishable:

ASCLEPIAS TUBEROSA L., f. **bicolor**, f. nov.—Corolla laete lutea; coronae squamae aurantiacae, apice interdum luteae.—INDIANA: Roadside near Porter, Porter County, July 20, 1929, *Paul C. Standley* 57304 (Herb. Field Mus. No. 599,386, TYPE).

In the dried specimens the color differences are not well preserved, but they are very conspicuous in living material.

VERNONIA MISSURICA Raf., f. **carnea**, f. nov.—Flores carnei vel rosei.—INDIANA: Roadside near Crocker, Porter County, September 2, 1929, *Paul C. Standley* 57350 (Herb. Field Mus. No. 599,385, TYPE).

The florets of this species are commonly purple, but in the form here described they are uniformly rose or flesh-colored. Only one clump of the pale-flowered plants was found.

EUPATORIUM PERFOLIATUM L., f. PURPUREUM Britton.—INDIANA: Edge of swamp near Tremont, Porter County, September 22, 1929, *Standley* 57362.

In this handsome and strikingly colored variant of the common boneset the flowers are of almost as deep a purple as in *E. purpureum*. I have found it in only one locality, but there it occurred in some abundance, with the normal white-flowered type.

COREOPSIS TRIPTERIS L., var. **Deamii**, var. nov.—Folia subtus pilis brevibus plerumque patentibus et saepe crispulis plus minusve dense pubescentia, supra scaberula vel rarius glabra; involucrum pilosulum vel villosulum.—ILLINOIS: Dry bluffs, Henderson County, August, 1871, *H. N. Patterson* (Herb. Field Mus. No. 17,866, TYPE). Marion County, in 1860, *Bebb*. Starved Rock, *Thone* 232. Dallas City, *Beckwith* 54. INDIANA: Pine, *Lansing* 3911. Clarke, Aug. 20, 1898, *Umbach*. MICHIGAN: Jackson County, Aug. 18, 1897, *S. H. & D. R. Camp*. "Southern Michigan," *Burgess* 433. MISSOURI: Near Jefferson Barracks, *Sherff* 1038. ARKANSAS: Near Texarkana, *Heller* 4129. PENNSYLVANIA: Marysville, Aug. 15, 1888, *Small*. NORTH CAROLINA: Salisbury, Aug. 21, 1890, *Heller*. Swain County,

August, 1891, *Beardslee & Kofoid.* GEORGIA: Estatoah Falls, Aug. 12, 1893, *Small.*

The usual form of *Coreopsis tripteris* is glabrous throughout. Linnaeus based the species upon a plate and description published by Morison (Pl. Hist. Univ. **3:** 21. *pl. 3, f. 44*), who states[1] that the plant had been sent from Virginia by Banister. Morison's description is couched in rather general terms, and there is no mention of pubescence, nor is any indicated in the illustration. The pubescence in the variety here described is, however, so inconspicuous, although ample in amount, that one would scarcely expect to find it mentioned, especially since it has been overlooked by more recent botanists. It is here assumed, merely as a matter of convenience, that the more common, glabrous form of *Coreopsis tripteris* is the typical one.

Var. *Deamii* was called to my attention recently by Mr. C. C. Deam, who showed me a large series of specimens collected at numerous localities in Indiana, and suggested that the form should receive a name. The variety is consequently named in his honor, since he is too modest to be willing to describe it himself. Modesty is not one of the usual besetting sins of botanists, and in this case it is all the more to be regretted upon the part of one who possesses a knowledge of the flora of the upper Mississippi Valley, such as probably will not be attained by any other botanist in the very near future.[2]

Mr. Deam pointed out a single variety of *C. tripteris*, in which both the leaves and involucres are pubescent. Examination of the material in the herbarium of Field Museum shows, however, that there is another, intermediate form, in which the leaves are pubescent beneath, but the involucres are glabrous. This, also, seems to deserve formal recognition.

COREOPSIS TRIPTERIS L., var. **intercedens**, var. nov.—Folia subtus breviter pilosula vel interdum scaberulo-pilosula, supra scaberula vel glabrata; involucrum glabrum.—ILLINOIS: Edgewater, Chicago, Aug. 23, 1905, *F. Gates* 808 (Herb. Field Mus. No. 458,716, TYPE). Carthage, *Gates* 10104. Hinsdale, *E. C. Smith* 511. Athens, August, 1864, *Hall.* INDIANA: Griffith, *Peattie* 2029. MARYLAND: Potomac Flats, above the District of Columbia, Aug. 12, 1877, *Ward.* NORTH CAROLINA: Faith, *Small & Heller* 100.

FIELD MUSEUM OF NATURAL HISTORY, Chicago.

[1] I am indebted to Dr. Ivan M. Johnston for a copy of Morison's description.
[2] The Editors of RHODORA heartily concur.

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Rhodora

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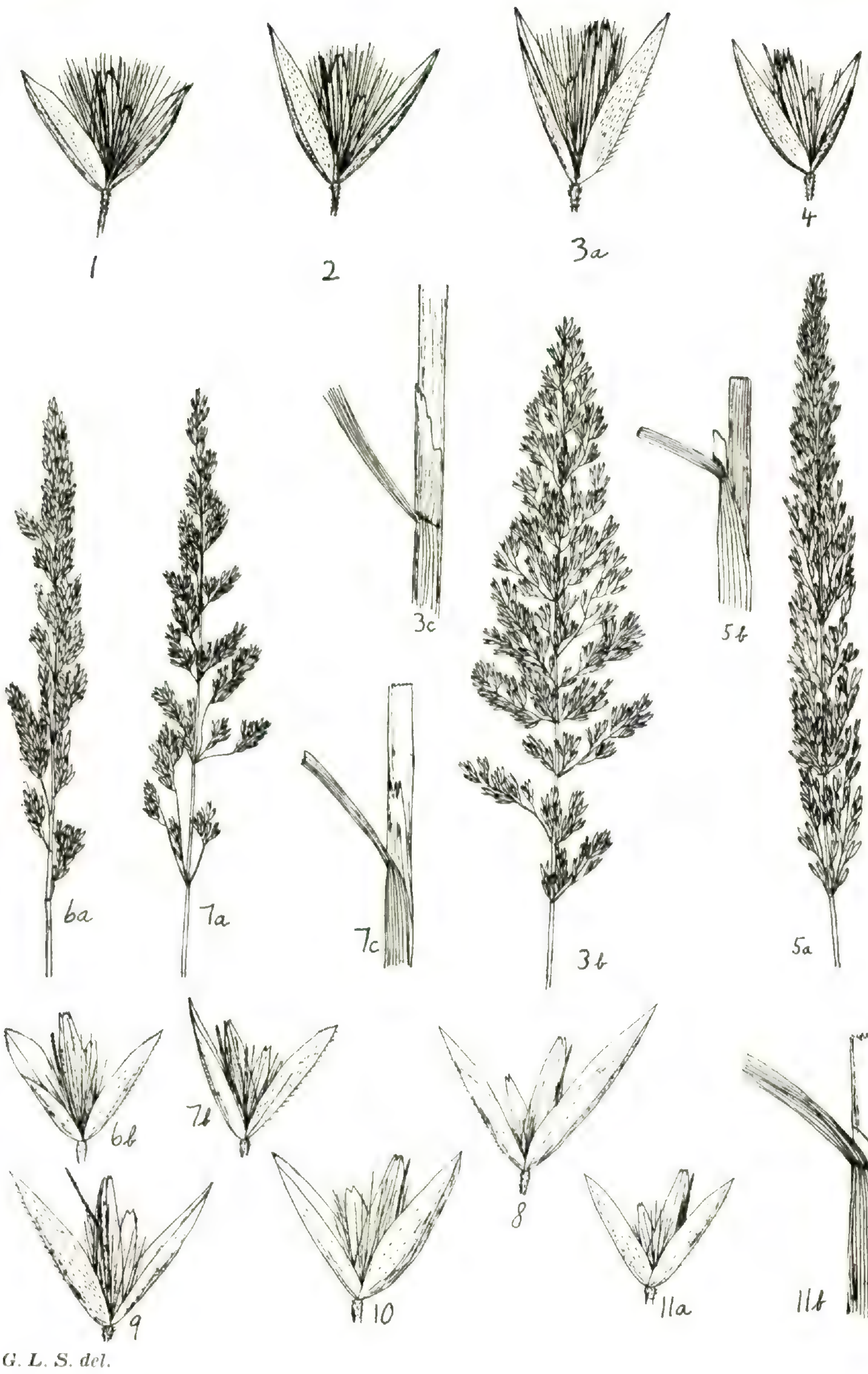

G. L. S. del.

Calamagrostis canadensis (fig. 1), var. robusta (fig. 2), var. Langsdorfi (figs. 3a, 3b and 3c), var. arcta (figs. 5a and 5b); C. Scribneri (fig. 4); C. inexpansa (figs. 6a and 6b); var. novae-angliae (figs. 7a, 7b and 7c); C. hyperborea (fig. 8); C. lapponica, var. brevipilis (fig. 9); C. labradorica (fig. 10); C. neglecta (figs. 11a and 11b).

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CONTRIBUTION FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. LXXXVII

(*Continued from page 11*)

III. A REVISION OF SOME NORTH AMERICAN SPECIES OF CALAMAGROSTIS

G. L. Stebbins, Jr.

(Plate 195)

The genus *Calamagrostis* is well known to students of grasses as one in which the species are exceedingly variable and difficult to define. The North American species, mostly boreal or alpine in distribution, have been studied by a number of the best known American grass specialists, in particular Dr. George Vasey, Dr. F. Lamson Scribner, and Dr. T. H. Kearney. The first attempt at a complete classification of the genus in North America, however, was made by Dr. Kearney in 1898.[1] This monograph did a great deal toward clearing up the confusion of names that had existed before this time, and it is the basis for the treatment of the genus in most of the manuals and local floras now in use.

The subdivision of the genus in Kearney's monograph is in many ways unsatisfactory, since it is based to a considerable extent on characters such as the expansion or contraction of the panicle and the flatness or involuteness of the leaves, characters which obviously vary with the habitat of the plant, and, in herbarium specimens, the manner in which the specimen was prepared. For a more sound

[1] T. H. Kearney—The Genus Calamagrostis in North America, Bull. U. S. Dept. Agric. Div. Agrost. xi. (1898).

subdivision of the genus it seems advisable to turn to European works, in which a number of subgenera and sections have been described. The treatment in Ascherson & Graebner's "Synopsis der Mittel-Europäischen Flora" (Vol. II, part 1, pp. 197–223) is probably the most satisfactory, and the description there given of the sections of the division *Quinquinerviae* of the subgenus *Eucalamagrostis*, the only division extensively represented in North America, is therefore quoted in translation:

a. *Quinquenerviae* T o r g e s Thür. BV. N. F. XII f. 1898. 23 [1899]). Glumes lanceolate, acuminate. Lemmas mostly 4-nerved above the insertion of the awn.

1. *Calamágris* (Dumortier Agrostogr. Belg. 126 [1823]. *Homoeotricha* T o r g e s Thür. BV. N. F. XII f. 1898 23 [1899]). Callus-hairs spread equally around the callus, forming a closed ring of hairs, and of equal length all around (the larger and straighter ones scattered throughout). Lemma considerably, mostly ⅓, shorter than the lower glume, completely, or at least in the upper ½ or ⅓ translucent-membranaceous. Awn delicate, straight, only in rare exceptions weakly geniculate. Palea considerably shorter than the lemma. Rhachilla not prolonged behind the floret, or the prolongation persisting as a short (rarely longer) hairy (rarely glabrous) little point.

2. *Deyeuxia* ([Clarion in P. B. Essai d'une nouvelle Agrost. 43. t. IX fig. 9, 10 [1812] as a Genus]. Torges Thür. BV. N. F. XII f. 1898 23 [1899] as a Section). Callus-hairs quite or almost completely interrupted below the middle of the lemma (through one group of scanty probably shorter hairs), the longest hairs situated on either side of the lemma and more or less crowded together, appearing tufted. Lemma almost always very slightly shorter (⅙–⅛) than the lower glume, toward the tip, the edges, and between the nerves translucent, otherwise chartaceous, herbaceous and more or less firm. Awn setiform, distinctly geniculate and twisted above the base, or straight and only exceptionally and indistinctly geniculate and weakly twisted. Palea little to considerably shorter than the lemma. Rhachilla always prolonged behind the base of the floret, above (in our species) with brush-like hairs.

a. Orthoátherae Torges Thür. BV. N. F. XII (1898). 24 (1899). Awn straight, only exceptionally indistinctly geniculate. Palea considerably (¼–⅓) shorter than the lemma.

b. Ancylátherae (Torges Thür. BV. N. F. XII [1898]. 24 [1899]). Awn geniculate and twisted. Palea almost as long as the lemma.

These subdivisions seemed to be based on more fundamental characters than those of Kearney, and a revision of § *Calamagris*, and § *Deyeuxia*, Subsect. *Orthoatherae* was undertaken with them as a basis. The *Ancylatherae*, most highly developed in the Condilleran Region and in South America, have been omitted on account of their great complexity and their scant representation in eastern America.

It was soon found, however, that some of the characters mentioned above do not hold for the American species. *Calamagrostis Scribneri*

Beal has the short, unequal callus-hairs of § *Deyeuxia*, although its thin, translucent-membranaceous lemma would place it in § *Calamagris*, and its habit is most nearly like that of *C. canadensis*, our most widely spread representative of that section. The lemma is, moreover, just as much shorter than the glumes in the species of *Deyeuxia* as in *Calamagris*, while the prolongation of the rhachilla is present in all species, and is quite as long in some varieties of *C. canadensis* (Michx.) Nutt. as in the majority of the species of the section *Deyeuxia*. The fundamental character separating the two sections, however, the texture of the lemma, is a constant one which, together with the difference in general habit, separates them quite definitely.

This paper deals with the species of the section *Calamagris* and of the subsection *Orthoatherae* in North America. The species are all highly variable, and intermediate forms between many of them were found. In fact, it would probably be possible in any of the subsections to form a continuous series of forms differing but slightly from each other which would include all of the species of the subsection. Species have, therefore, been recognized wherever a clearly definable entity exists with a definite range, and with only a few intermediates between it and closely related forms. Where species already described have been found to pass imperceptibly into related species, with many intermediates where their ranges overlap, it has seemed advisable to relagate them to varieties, even though, in their typical forms, they are quite distinct from each other. *Calamagrostis Langsdorfi* (Link) Trin. is therefore treated, following Inman (RHODORA, xxiv. 143), as a variety of *C. canadensis* (Michx.) Nutt., while *C. Macouniana* Scribn. and *C. micrantha* Kearney have been made varieties of *C. canadensis* and *C. neglecta* (Ehrh.) Gaertn. respectively.

In view of these facts, there is little doubt that closely related species of this genus hybridize with each other, and that this is one cause of the complexity of the genus. Some of the species which have been collected only once or twice may be hybrids between more distantly related species, while a few forms obviously intermediate in their characters will be discussed as such.

The following treatment is the result of the examination of the specimens in the Gray Herbarium, the herbarium of the New England Botanical Club (cited as N. E.) and of the types and the more critical specimens in the United States National Herbarium (cited as U. S.), the herbarium of the New York Botanical Garden, and the National Herbarium of Canada.

KEY TO THE SPECIES OF CALAMAGROSTIS § CALAMAGRIS AND § DEYEUYIA, SUBSECTION ORTHOATHERAE IN NORTH AMERICA

a. Panicle mostly loose and open; the branches spreading at flowering time: lemma membranaceous-translucent, at least in its upper third: the nerves prominent: awn straight. . . . *b.*

b. Sheaths glabrous at the summit: tip of the lemma erose or 4-toothed; the teeth obtuse or acute: callus-hairs equalling or exceeding the lemma, of approximately equal length, except for an outer ring of shorter hairs. . . . . 1. *C. canadensis.*

b. Sheaths bearded at the summit, or more rarely glabrous: lemma sharply 4-toothed; the teeth acuminate through the excurrence of the nerves: callus-hairs distinctly shorter than the lemma, somewhat unequal in length. . 2. *C. Scribneri.*

a. Panicle sometimes loose and open, more generally narrow and contracted; its rigid branches appressed or ascending even at flowering time: lemma firm and opaque, if occasionally translucent the awn strongly bent and twisted; the nerves frequently indistinct: callus-hairs usually shorter than the lemma, of markedly unequal length; those at the sides of the lemma distinctly longer and tufted: awn straight, or bent and twisted. . . . *c.*

c. Awn straight or slightly bent: palea ⅔–⅘ as long as the lemma. . . . *d.*

d. Prolongation of the rhachilla bearded only at the summit: caryopsis pubescent, particularly at the summit. 3. *C. cinnoides.*

d. Prolongation of the rhachilla bearded throughout its length: caryopsis glabrous. . . . *e.*

e. Leaves broad, flat and lax: glumes translucent, pale and whitish: palea 3.5–4 mm. long, ⅘ as long as the lemma. . . . . 4. *C. scopulorum.*

e. Leaves firmer and more rigid, flat or involute: glumes opaque, or if translucent distinctly green, yellowish, or purple-tinged: palea rarely over 3 mm. in length. . . . *f.*

f. Foliage and culms harsh and scabrous: ligules of the upper culm-leaves 2.5–8 mm., averaging 4 mm., long; their margins erose or lacerate. . . . *g.*

g. Branches of the panicle slender and flexuous, very slightly scabrous: spikelets 3 mm. long: prolongation of the rhachilla 0.5 mm. long. . 5. *C. lucida.*

g. Branches of the panicle stout, rigid, strongly scabrous: spikelets 3–6 mm. long: prolongation of the rhachilla 0.6–1.5 mm. long. . . . . 6. *C. inexpansa*

f. Foliage smooth, the leaves occasionally scabrous on the tip, the margin, and the upper surface: ligules of the upper culm-leaves 1.5–3.5, averaging 2 mm., long: their margins entire or slightly erose, truncate. . . . *h.*

h. Culms stout: culm-leaves 3–4 mm. broad, flat or involute: panicle short and very dense, 5–8 cm. long. . . . *i.*

i. Culm-leaves involute, at least in drying, 4–13 cm., the upper averaging 4–6 cm., long: glumes very thick and broad, 2 mm. broad when laid out flat: palea ⅘ as long as the lemma: species of the Pacific Coast. 7. *C. crassiglumis.*

i. Culm-leaves flat, 10–14 cm., the upper averaging 10–12 cm., long: glumes thinner, often hyaline at the tip and on the margins, narrower: palea ¾ as long as the lemma: species of Greenland....8. *C. hyperborea.*

h. Culms more slender: culm-leaves 2–3 mm. broad, involute at least in drying, if occasionally flat and over 3 mm. broad, the panicle loosely flowered and 9–15 cm. long.*j.*

j. Glumes thick and opaque, 1.4–1.8 mm. broad when flattened out: branches of the panicle very short, the longest ⅕ its length.....9. *C. labradorica.*

j. Glumes hyaline and translucent, at least at the tip and on the margins, 1–1.2 mm. broad: branches of the panicle mostly longer, ⅕–⅓ its length....*k.*

k. Spikelets 2–4.8 mm. long:[1] lemma 1.8–3.8 mm. long: palea 1.2–2.5 mm. long: awn straight.....10. *C. neglecta.*

k. Spikelets 4.5–5.5 mm. long: lemma 3.8–4 mm. long: palea 2.8–3 mm. long: awn curved or weakly geniculate, not twisted.....11. *C. lapponica.*

c. Awn strongly, or at least once or twice twisted at the base, and distinctly bent or geniculate: palea nearly or quite equalling the lemma.....Subsection *Ancylatherae.*

1. Calamagrostis canadensis (Michx.) Nutt. Gen. i. 46 (1818). A very variable species, of which the following are well marked varieties:

a. Glumes green or purple-tinged, equal or nearly so: awn inserted on the lower two-thirds of the lemma....*b.*

b. Spikelets 2–3.8 mm. long: glumes rounded on the back, weakly keeled, acute or acuminate: lemma 1.7–3 mm. long: awn inserted near the middle of the lemma....*c.*

c. Panicle loosely flowered: spikelets 2.8–3.8 mm. long: glumes distinctly exceeding the lemma, acute or acuminate.....Var. *typica.*

c. Panicle densely flowered: the ultimate branchlets short and and appressed: spikelets 2.2–2.8 mm. long: glumes nearly or quite equalled by the lemma, obtuse or acute. Var. *Macouniana.*

b. Spikelets 3.8–6 mm. long: glumes narrow, strongly keeled, and distinctly acuminate: lemma 3–4.2 mm. long: awn inserted on the lower third of the lemma....*d.*

d. Spikelets 3.8–4.5 mm. long: glumes often hyaline on the tip and on the margin, short-scabrous on the keel, elsewhere minutely pubescent-scabrous: lemma 3–3.5 mm. long.....Var. *robusta.*

d. Spikelets 4.5–6 mm. long: glumes usually thick and opaque throughout, scabrous or ciliate on the keel, elsewhere pubescent: lemma 3.5–4.2 mm. long....*e.*

[1] In all the species, the length of the spikelets varies considerably in the same panicle, those at the base being considerably shorter than those at the summit. For the sake of uniformity, the measurements are in every case based on spikelets taken from the middle of the panicle.

e. Culm-leaves broad and flat; their ligules 4–10 mm. long: panicle expanded at flowering time: glumes ciliate on the keel, elsewhere distinctly and rather densely pubescent.....Var. *Langsdorfi.*

e. Culm-leaves involute, at least in drying; their ligules 1.5–3 mm. long: panicle narrow and contracted, even at flowering time: glumes short-scabrous on the keel, elsewhere minutely and sparsely pubescent..Var. *arcta.*

a. Glumes membranaceous and translucent on the tip and the margins, pale-green or whitish, distinctly unequal, the upper more acuminate than the lower: awn inserted on the upper fourth of the lemma, considerably exceeding it.....Var. *blanda.*

Var. **typica.** *C. canadensis* (Michx.) Nutt., as to synonymy. *Arundo canadensis* Michx. Fl. Bor.-Am. i. 73 (1803). *Agrostis mexicana* Pers. Syn. i. 76 (1805). *C. canadensis?* Beauv. Agrost. 157 (1812), as *nomen nudum*. *Arundo agrostoides* Pursh, Fl. Am. Sept. i. 86 (1814). *C. mexicana* Nutt. Gen. i. 46 (1818). *C. agrostoides* Trin. Gram. Unifl. 228 (1824). *Cinna? Purshii* Kunth, Enum. i. 208 (1833). *Arundo fissa* Willd., Steud. Nom. ed. 2, i. 44 (1840). *Calamagrostis Michauxii* Trin., Steud. Nom. ed. 2, i. 250 (1840). *C. canadensis campestris* Kearney, Bull. U. S. Dept. Agr. Div. Agrost. xi. 31 (1898). *C. inexpansa cuprea* Kearney, ibid. 37 (1898).—Newfoundland to British Columbia, south to Delaware, Ohio, Missouri, New Mexico, and California. The following are typical: Newfoundland: talus of sandstone cliffs, Western Bay, Conception Bay, *G. S. Torrey*, no. 112. Quebec: Rivière Moisie, sur les alluvions près de l'embouchure, *Victorin & Rolland*, no. 18,200; Ile Plâte, near Montreal, *Victorin*, no. 734; swamp, Ascot, Sherbrooke Country, *E. B. Chamberlain & C. H. Knowlton*, July 29, 1923; Arbor Vitae swamp west of Locked Camp, Rivière Cap Chat, Matane County, *M. L. Fernald & L. B. Smith*, no. 25,478; tourbière, Pointe Sud Ouest, Anticosti, *Victorin & Rolland*, no. 24,372. New Brunswick: Shediac Cape, *F. T. Hubbard*, no. 722; Lily Lake, St. John's, *William Boott*, August 8, 1873. Maine: Green Mt., Mt. Desert Island, *E. & C. E. Faxon*, July 26, 1888; Kennebunkport, *G. G. Kennedy*, July 18, 1888. New Hampshire: in deep, wet woods, Jaffrey, *B. L. Robinson*, no. 353; roadside north of Crawford House, *E. & C. E. Faxon*, July 27, 1895; Breezy Point, Warren, *E. F. Williams*, July 24, 1908. Vermont: along the Connecticut River, Norwich, *E. F. Williams*, July 11, 1910; Smuggler's Notch, *C. E. Faxon*, August 10, 1877. Massachusetts: Revere, *H. A. Young*, June 24, 1879; Neponset Meadow, Canton, *G. G. Kennedy*, June 26, 1894; Holbrook, *J. M. Greenman*, no. 3152. Rhode Island: Cat Swamp, Providence, *J. F. Collins*, July 2, 1893. Connecticut: Southington, *L. Andrews*, no. 634; wet meadow, Columbia, Tolland County, *C. A. Weatherby*, no. 4088 (N. E.). New York: Stony Creek Ponds, Adirondack Mountains, *W. W. Rowlee, K. M. Wiegand, & G. T. Hastings*, July 10, 1899; shore of Oneida Lake, South Bay, Madison County, *H. D. House*, June 14, 1918; summit marsh, Spencer, Tioga County, *F. P. Metcalf*, no. 5674; Fisher's

Island, Suffolk County, *Harold St. John*, no. 2556. PENNSYLVANIA: along wet ditch, Quakertown, Bucks County, *W. M. Benner*, June 17, 1922. DELAWARE: Newcastle, *Edward Tatnall*. ONTARIO: Sharbot Lake, *J. Fowler*, July 16, 1898; Plevna, *J. Fowler*, July 26, 1902. MICHIGAN: sandy shore of Douglas Lake, Cheboygan County, *J. H. Ehlers*, no. 538; Isle Royale, *W. S. Cooper*, no. 169. OHIO: swamp at Cedar Point Hotel, Sandusky, *E. L. Morris*, no. a.67. INDIANA: slough, Millers, *O. E. Lansing, Jr.*, no. 2729. WISCONSIN: Point Sable, Green Bay, *J. H. Schuette*, July 19, 1883. ILLINOIS: in a drained tamarack swamp, Lake Villa, *H. A. Gleason & F. D. Shobe*, no. 116. MINNESOTA: Star Island, Cass Lake, *L. H. Pammel, H. E. Pammel & P. S. McNutt*, no. 824. IOWA: Ames, *C. R. Ball*, no. 133; Spirit Lake, *L. H. Pammel*, no. 555. MISSOURI: Buckner, *B. F. Bush*, no. 6763. SOUTH DAKOTA: Hill City, *David Griffiths*, no. 740. NEBRASKA: Scotia, *J. M. Bates*, June 22, 1908. MONTANA: Big Fork, Flathead Lake, *Mrs. Joseph Clemens*, July 22, 1908. IDAHO: near Britton, St. Joseph's River, *J. B. Leiberg*, no. 1299. WYOMING: Laramie River, Albany County, *Elias Nelson*, no. 442. COLORADO: Gunnison, *C. F. Baker*, no. 554. NEW MEXICO: Ponchuelo Creek, *P. C. Standley*, no. 4184. WASHINGTON: Big Meadows, Ione, *Frank O. Kreager*, no. 411. BRITISH COLUMBIA: above snowsheds, Glacier, *Stewardson Brown*, no. 630.

Typical *Calamagrostis canadensis*, common throughout the northern United States and southern Canada, is quite constant and distinct in the southern part of its range, but in northern New England, the Gulf of St. Lawrence region, and in the Rocky Mountains passes imperceptibly into the forms with larger spikelets, while in the Great Plains and the Mississippi Valley it grades equally imperceptibly into forms with smaller spikelets and blunter glumes. It seems best, therefore, to regard all of these forms as geographic varieties of a single species rather than to split species on characters which do not hold for a large percentage of intermediate forms.

Var. **Macouniana** (Vasey), n. comb. *Deyeuxia Macouniana* Vasey, Bot. Gaz. x. 297 (1885). *C. Macouniana* Vasey, Monogr. Grasses U. S., Contr. U. S. Nat. Herb. iii. 81 (1892).—Prince Edward Island and locally along the Atlantic Coast to New Jersey; and from Saskatchewan to Alberta and Montana, south to Missouri. Specimens examined: PRINCE EDWARD ISLAND: fresh or slightly brackish reclaimed marshes along Hillsborough River, Mt. Stewart, *M. L. Fernald et al.*, no. 6857. MASSACHUSETTS: swampy woods, Brewster, *M. L. Fernald and Bayard Long*, no. 17,936. CONNECTICUT: Hartford, *A. W. Driggs*, July 18, 1900. NEW JERSEY: Delanco, Burlington County, *Bayard Long*, August 10, 1909. MISSOURI: Lake City, *B. F. Bush*, no. 6839. NORTHWEST TERRITORY: borders of marshes, *J. Macoun*, 1883. NORTH DAKOTA: Leeds, Benson County, *J. Lunell*, July 13, 1902.

There seems to be no sharp difference between *Calamagrostis Macouniana* Vasey and *C. canadensis*. The spikelets are smaller in the former, and the glumes less acute, but forms with spikelets intermediate in both characters are common. The original material from Assiniboia, and the specimens from North Dakota and Missouri have narrow leaves and short, more contracted panicles, but these characters, are by no means constant, and the specimens from the Atlantic coast, while having the spikelets of *C. Macouniana*, have broad leaves and longer panicles, although the panicle is still more densely flowered than in typical *C. canadensis*. O. L. Inman (Rhodora, xxiv. 143) states, in addition to these characters, that the palea and lemma are subequal in *C. Macouniana*, but the writer has found the same range of proportions between the lengths of the two as in typical *C. canadensis*, and the original description of *C. Macouniana* states that the palea is ⅓ shorter than the lemma. *C. Macouniana*, therefore, is not distinct enough from *C. canadensis* to be considered a separate species.

Var. robusta Vasey in Rothr. in Wheeler Rep. vi. 285 (1878). Var. *acuminata* Vasey in Rydberg & Shear, Bull. U. S. Dept. Agr. Div. Agrost. v. 26 (1897).—Labrador to Alaska, south to northern New England, New York, the mountains of North Carolina, Ontario, Isle Royale, Michigan, and in the mountains to New Mexico, and California. Also northern Asia. The following are typical: Labrador: Kikkertasoak Island, Saglek Bay, *R. H. Woodworth*, no. 58; Hopedale, *J. D. Sornborger*, no. 242; boggy thickets, Forteau, *Bayard Long*, no. 27,487. Newfoundland: wet places along the railroad, Stephenville Crossing, *K. K. Mackenzie & Ludlow Griscom*, no. 10,072; on hill south of St. John's, *M. L. Fernald & K. M. Wiegand*, no. 4570. Quebec: sur les dunes au nord de l'estuaire, Natashquan, *Victorin & Rolland*, no. 18,204; subalpine meadows, 900–1100 m., western slope of Mt. Logan, Matane County, *M. L. Fernald & L. B. Smith*, no. 25,479; Little Metis, *J. Fowler*, July 25, 1906; meadows and swamps southeast of Bic, Rimouski County, *M. L. Fernald & J. F. Collins*, no. 877; alluvium, River Ste. Anne-des-Monts, *J. F. Collins & M. L. Fernald*, August 3-17, 1915; Lac Tremblant, Terrebonne County, *J. R. Churchill*, July 19, 1922; bois humides, Rivière Natiskotek, Anticosti Island, *Victorin & Rolland*, no. 27,837; basin, Ile du Havre-au-Ber, Magdalen Islands, *Victorin & Rolland*, no. 9030. Nova Scotia: summit of Bird Island, Cape Breton, *George E. Nichols*, no. 590; Canso, *J. Fowler*, August 10, 1901, Maine: Allagash River at Two Brooks, Aroostook County, *Emile F. Williams*, July 28, 1900; Slide, west wall of North Basin, Mt. Katahdin, *M. L. Fernald*, July 13, 1900. New Hampshire: Mt. Willard, *E. & C. E. Faxon*, July 20, 1875; Tuckerman's Ravine, Mt. Washington, *G. G. Kennedy*, July 11, 1895; summit of Mt. Moosilauke, *E. F. Williams*, August 3, 1908.

Vermont: Mt. Mansfield, *W. W. Eggleston*, no. 2475. North Carolina: Roan Mt., *F. L. Scribner*, July, 1889. Hudson Bay: Churchill, lat. 58° 50′, *J. M. Macoun*, no. 79,125. Alberta: near Edmonton, *John Macoun*, August, 1872; Devil's Head Lake, Banff, *J. Macoun*, August 3, 1891. Montana: Swan Lake, *Mrs. Joseph Clemens*, August 25, 1908. Idaho: Trinity Lake Region, Elmore County, *J. F. Macbride*, no. 707. Wyoming: Doyle Creek, Big Horn County, *L. N. Goodding*, no. 393; Johnson's Ranch, *Aven Nelson*, no. 3905. Colorado: Anita Peak, Routt County, *L. N. Goodding*, no. 1752; near Pagosa Peak, *C. F. Baker*, August, 1899; Twin Lakes, *John Wolfe*, no. 1093, 1873 (type, in U. S. National Herbarium). New Mexico: Winsor Creek, Pecos River National Forest, *P. C. Standley*, no. 4748. California: Angora Peak, Tahoe, 8000 feet, *F. J. Smiley*, no. 312. Oregon: Gibbon, Blue Mts., *Wm. C. Cusick*, no. 3611; wet places near stream, 3 miles above Wallowa Lake, *C. L. Shear*, no. 1797. Washington: gravelly soil, Cheelum Creek, Kittitas County, *J. S. Cotton*, no. 832; Cascade Mts., *Sandberg & Leiberg*, no. 795. British Columbia: Moose Lake, *N. Hollister*, no. 20; Kicking Horse Valley, vicinity of Field, *Stewardson Brown*, no. 498; near railroad, Rogers Pass, 4400 feet, *H. Peterson*, no. 468. Alaska: St. Michaels, *L. M. Turner*, no. 94,258.

This variety is quite distinct from typical *Calamagrostis canadensis* and replaces it to a large extent in Newfoundland, the Gulf of St. Lawrence region, and in the Rocky Mountains. It grades, however, imperceptibly into the typical form on the one hand, and to var. *Langsdorfi* on the other.

Specimens from Eastern Asia (Huigan, Manchuria, *Dorsett & Dorsett*, no. 3740; Heosomui and Aemuro, Yezo, Japan, *K. Miyabe*) are identical with North American forms of this variety, and it is probably general throughout north temperate Eastern Asia.

Var. Langsdorfi (Link). Inman, Rhodora xxiv. 143 (1922). *Arundo Langsdorfi* Link, Enum. Pl. Hort. Berol. i. 74 (1821). *C. Langsdorfii* Trin. Gram. Unifl. 225, t. 4, fig. 10 (1824). *C. scabra* Presl, Rel. Haenk. i. 234 (1828). *Deyeuxia Langsdorfii* Kunth, Rev. Gram. i. 77 (1829). *C. hirtigluma* Steud. Syn. Pl. Gram. 188 (1855)? *C. oregonensis* Buckl. Proc. Acad. Phil. 1862, 92 (1863) in part, acc. to Gray, ibid. 334 (1863). *C. columbiensis* Nutt., Gray l. c. *C. alaskana* Kearney, Bull. U. S. Dept. Agr. Div. Agrost. xi. 32 (1898). *C. Trinii* Almq. & Lehb, Svensk. Bot. Tidsskr. v. 374 (1916). —Of circumpolar distribution, in North America extending south to eastern Quebec, the mountains of New England, North Carolina?, Isle Royale, Michigan, and in the mountains to Colorado and California. Although Kearney recorded this variety from Roan Mountain, North Carolina, all specimens from there, seen by the writer, have been var. *robusta* Vasey. The following are typical: Greenland:

ca. Neria, 61° 33′ lat. bor. *J. Eugenius*, July 19, 1924; Quagssiarssuk, Igaliko-Fjord, 60° 53′ N. lat., *A. E. Porsild & M. P. Porsild*, August 5, 1925. Labrador: on granitic rock, river delta at head of Nachvak Bay, *R. H. Woodworth*, no. 60; Eclipse Harbor, *H. S. Forbes*, no. 11. Newfoundland: rocky meadows and brook bottoms, upper Deer Pond Brook, Highlands of St. John, *M. L. Fernald & Bayard Long*, no. 27,488; dry meadow, Bay St. George, *C. D. Howe & W. F. Lang*, no. 1014. Quebec: Blanc Sablon, *Ludlow Griscom*, no. 11; vielle prairie, Pointe-aux-Esquimaux, *Victorin & Rolland*, no. 18,209; rocky shore, Bonaventure Island, *Fernald & Collins*, no. 884; à la limite des arbres, sur les schistes hornblendiques, alt. 1300 m., Mt. Albert, *Victorin & Rolland*, no. 17,799. New Hampshire: five-mile post, Mt. Washington, *E. & C. E. Faxon*, July 9, 1895; Mt. Willey, *Faxon*, August 25, 1877; Echo Lake, Mt. Lafayette, *E. & C. E. Faxon*, September 14, 1890. Vermont: Smuggler's Notch, *E. & C. E. Faxon*, August 10, 1877. Ontario: near Silver Islet, *Henry Elman*, no. 64. Michigan: Isle Royale, Lake Superior, *T. C. Porter*, August 2, 1865. Colorado: wet grounds, 8000–10,000 ft. alt., Golden City, *E. L. Greene*, no. 437. California: wet places, Yosemite Valley, *H. N. Bolander*, no. 6088. Oregon: marsh, Pamalia Lake, foot of Mt. Jefferson, *Nelson*, no. 2784. Washington: base of Totoish Mountains, alt. 5000 ft., *O. D. Allen*, no. 176. British Columbia: Huchayak, *McKay*, 1882; Nootka, Vancouver Island, *Scouler*. Yukon Territory: Lake Kluane to Don Jek River, *A. Müller*, August 11–27, 1920. Alaska: False Pass, Unimak Island, *O. J. Murie*, August 7, 1925; Atkha Island, *L. M. Turner*, no. 1188; Ankon River, Yakutat Bay, *Funston*, no. 131; LeConte Bay, *Walker*, no. 873; St. Paul Island, Bering Sea, *Macoun*, no. 94,257.

Var. *Langsdorfi* in the arctic regions is very distinct from typical *Calamagrostis canadensis*, but there are so many intermediates between it and var. *robusta* where their ranges overlap, that it seems inadvisable to maintain it as a species. It is, however, as Dr. Eric Hultén suggested (Flora Kamtchatka, i. 103 (1927)), the central "link in the chain of closely allied forms together constituting a circumpolar type," and it is probable that the more southern forms have been evolved from it. Whether, as he further suggests, *C. villosa* Mutel and *C. purpurea* Trin., both of Eurasia, are merely varietal offshoots from this type, the writer has not seen enough critical material to judge. Certainly the European specimens of *C. villosa* seem very distinct from any American form, in their very narrow, long-acuminate glumes, long callus-hairs, and leaves long-pilose on the upper surface. If *C. villosa* and *C. Langsdorfi* were varieties of the same species, the whole set of forms, including *C. canadensis* and varieties, would have to be treated as varieties of *C. villosa*, that being the earliest name. How-

ever, in the opinion of the writer, this is not the case. He has not seen any authentic material of *C. purpurea* from Eastern Asia, where it was originally collected, but Scandinavian material (which Dr. Hultén suggests may be a hybrid) seems quite distinct from *C. Langsdorfi*. However, the final decision on these points will have to be left to European systematists.

Calamagrostis lactea Beal, Grasses N. A. ii. 346 (1896) (*C. Langsdorfi* var. *lactea* Kearney) is a peculiar form with the expanded panicle, the thin, hyaline lemma, and the short palea of this variety, but with the callus-hairs only two-thirds the length of the lemma, and the awn geniculate and twisted at the base. It is probably a hybrid between *C. canadensis* var. *Langsdorfi* and *C. nutkaensis* Presl.

Var. **arcta**, n. var., culmis erectis 4–6 dm. altis; foliis caulinis brevibus 7–12 cm. longis involutis scabris, ligulis suis 1.5–2.5 mm. longis; panicula 10–15 cm. longa contracta longissimis ramis suis 4–5 cm. longis; glumis in carina scabris, alibi minute pubescentibus vel glabris; lemmate 3.6–4.2 cm. longo, arista vix infra medium inserta recta, pilis lemma aequantibus vel excedentibus, nonnumquam paulo brevioribus; palea 2.8–3 mm. longa; processu 0.7–0.8 mm. longo barbato; antheris 1.4 mm. longis.

Culms erect, 4–6 dm. tall: cauline leaves short, 7–12 cm. long, involute, scabrous; their ligules 1.5–2.5 mm. long: spikelets 4–5 mm. long: glumes scabrous on the keel, elsewhere minutely pubescent or glabrous: lemma 3.6–4.2 mm. long: awn inserted just below the middle, straight: callus-hairs equalling or exceeding the lemma, sometimes a little shorter: palea 2.8–3 mm. long: prolongation of the rhachilla 0.7–0.8 mm. long, bearded: anthers 1.4 mm. long.—Greenland and Labrador. TYPE specimen in Gray Herbarium, collected on granitic cliffs at 150–600 m. at the Head of Nachvak Bay, Torngat Region, Labrador, *R. H. Woodworth*, no. 62, distributed as *C. hyperborea* Lange. Specimens examined: GREENLAND: Arfersiorfik Fjord, west Greenland, lat. 67° 53′ N., long. 50° W., *Porsild*, July 7, 1924. LABRADOR: Nachvak Bay, *Woodworth*, no. 62; north arm of Saglek Bay, *Woodworth*, no. 63 (as *C. hyperborea*).

A very distinct variety, resembling *Calamagrostis inexpansa* in its narrow, contracted panicle, and *C. neglecta* in its short ligules, but with the spikelets of *C. canadensis* var. *Langsdorfi*. The Greenland specimen differs in its shorter callus-hairs. It may be identical with *C. lapponica* var. *groenlandica* Lange (Consp. Fl. Groen. ii. 296 [1897]), but *C. lapponica* differs in its thicker, opaque lemma and curved or slightly geniculate awn.

Var. **pallida** (Vasey & Scribn.), n. comb. *Calamagrostis pallida* Vasey, Monogr. Grasses U. S., Contr. U. S. Nat. Herb. iii. 79 (1892).

C. blanda Beal, Grasses N. Am. ii. 349 (1896).—Wyoming and Montana to Washington, north to Alaska. Specimens examined: Wyoming: Yellowstone Park, *C. C. Parry*, no. 300; Lewis River to West Thumb, Yellowstone Park, *E. D. Merrill*, no. 151. Washington: along streams, Blue Mts., Columbia County, *Robert M. Horner*, no. R495B536; Washington Territory, *W. N. Suksdorf*, 1884. Alaska: Lake Iliamna Region, *M. W. Gorman*, no. 220.

Since the name *pallida* was used before Vasey & Scribner only by C. Mueller (Walp. Ann. vi. 986) for a variety or subspecies of *C. Halleriana* DC., it seems best to retain it for this American form.

While appearing quite distinct from *Calamagrostis canadensis*, *C. pallida* is separated by no reliable characters. Shade forms of *C. canadensis* exactly simulate *C. pallida* in shape and texture of glumes, while the flexuousness of the panicle-branches, a character used by Kearney to separate the two species, is very variable in both forms. The only definite character separating the two is the position of the insertion of the awn, and since aberrant forms with all the characters of *C. canadensis* but with the awn inserted near the tip of the lemma have been found (Alexis, Ohio, *H. A. Young*, June 28, 1885) it has seemed best to relegate *C. pallida* to a variety of *C. canadensis*.

2. C. Scribneri Beal, Grasses N. Am. ii. 343 (1896). *Deyeuxia dubia* Scribn. Bot. Gaz. xi. 174 (1886), not *Calamagrostis dubia* Bunge, Lehm. Rel. 348 (1847). *C. dubia* Scribn. in Vasey, Monogr. Grasses U. S., Contr. U. S. Nat. Herb. iii. 80 (1892). *C. canadensis dubia* Vasey l. c. *C. Langsdorfi* var. *Scribneri* M. E. Jones, Contrib. West. Bot. xiv. 9 (1912).—Montana and Colorado to Oregon and Washington. Specimens examined: Wyoming: Slough Creek, Yellowstone Park, *Frank Tweedy*, no. 385. (type in U. S. National Herbarium). Idaho: Collins, *C. V. Piper*, no. 2815. Colorado: near Pagosa Peak, alt. 10,000 ft., *Th. Holm*, August 20, 1896. Oregon: granitic subalpine meadows, Wallowa Mts., 1660 m. alt., *Cusick*, no. 3120.

Quite distinct from all varieties of *Calamagrostis canadensis* in its bearded sheaths, short callus-hairs and longer palea. Specimens from eastern Quebec referred to this species are all forms with narrow panicles of *C. canadensis*.

Var. **imberbis**, n. nom. *C. anomala* Suksd. in Allg. Bot. Zeit. xii. 43 (1906), not Steud. in Lechl. Berb. Am. Aust. 56 (1857). Sheaths glabrous at the summit: palea shorter, ⅔ as long as the lemma, sometimes with a weak awn at the tip: otherwise as in the preceding.—Alberta and Wyoming to Washington. Specimens examined: Alberta: Kicking Horse Lake, *Macoun*, August 16, 1890. Wyoming: Woods Creek, *Nelson*, no. 3954. Washington: dry, loose soil, Chiquash Mts., *Suksdorf*, no. 2824 (type of *C. anomala* Suksd.).

Approaching *Calamagrostis canadensis* var. *robusta*, but differing in its narrower panicle with erect branches, short, unequal callus-hairs, and acutely toothed lemma.

3. C. CINNOIDES (Muhl.) Bart. Fl. Phila. i. 45 (1818). *Agrostis glauca* Muhl. Descr. Gram. 76 (1817), not *Arundo glauca* Bieb. *Arundo cinnoides* Muhl. Descr. Gram. 187 (1817). *C. canadensis* Nutt. Gen. i. 46 (1818) as to description, not *Arundo canadensis* Michx. *Arundo stricta* Spreng. Neu. Entdeck. i. 247 (1820) not Timm. *Phalaris arundinacea* Spreng. l. c. *P. americana* Spreng. l. c. *C. Langsdorfii Marylandica* Trin. Gram. Unifl. 225 (1824). *C. glauca* Trin. ibid. 228. *Arundo coarctata* Torr. Fl. U. S. 94 (1824). *A. canadensis* Nutt., Steud. Nom. ed. 1, 144 (1840). *C. Nuttalliana* Steud. ibid. 251. *C. coarctata* Torr. in Gray, Gram. et Cyp. i. no. 19 (1834). *Deyeuxia Nuttalliana* Vasey, Descr. Cat. Grasses U. S. 51 (1885).—Nova Scotia and Maine to Ohio, south to Georgia and Alabama. The following are typical: NOVA SCOTIA: Halifax, *J. R. Lunt*, July 18, 1912. MAINE: South Berwick, *J. C. Parlin*, September 12, 1896. NEW HAMPSHIRE: Hampton Beach, *A. A. Eaton*. MASSACHUSETTS: Purgatory, Dedham, *C. E. Faxon;* Barnstable, *J. M. Greenman*, no. 374. CONNECTICUT: Portland, Middlesex County, *Frances Wilson*, no. 70; Southington, *C. H. Bissell*, no. 743. NEW YORK: north side, Staten Island, *A. Gershoy*, no. 767. NEW JERSEY: Egg Harbor, *C. H. Bissell*, September 11, 1915; Lindenwold, Camden County, *J. M. Fogg, Jr.*, no. 608. PENNSYLVANIA: Red Rock Barren, Bushkill, Pike County, *E. B. Bartram*, August 3, 1918. DELAWARE: Pencader, *Edward Tatnall.* MARYLAND: near Clinton, *Th. Holm*, August 30, 1921. DISTRICT OF COLUMBIA: Tacoma, *T. H. Kearney, Jr.*, August, 1895. SOUTH CAROLINA: Caesar's Head, *J. D. Smith*, August, 1881. GEORGIA: Woodbury, Meriwether County, *R. M. Harper*, no. 1256.

4. C. SCOPULORUM M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, v. 722 (1895). *C. scopulorum* var. *lucidula* Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 33 (1898).—Utah. Specimens examined: UTAH: Altah, *M. E. Jones*, no. 1145 (TYPE of *C. scopulorum* var. *lucidula* Kearney); Armstrong and White Canyons, *Rydberg & Garrett*, no. 9512 (U. S.).

Var. **Bakeri**, n. var., arista inter dentes lemmatis inserta.

Awn inserted between the teeth of the lemma.—Near Pagosa Peak, at 9,000 feet, southern COLORADO, *C. F. Baker*, no. 162, August, 1899 (TYPE, in Gray Herbarium).

5. C. LUCIDA Scribn. Circ. U. S. Dept. Agric. Div. Agrost. xxx. 8 (1901). *Deyeuxia neglecta* var. *gracilis* Scribn. Bot. Gaz. lx. 175 (1886). *C. laxiflora* Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 34 (1898), not Philippi, Anal. Univ. Chile (Pl. Nuev. Chilen.) xciv. 18 (1896).—Meadows, East Fork, YELLOWSTONE PARK, *Tweedy*, no. 582.

A peculiar form, known only from the type specimens. It has the short callus-hairs, opaque lemma, and glumes with the texture of those of *Calamagrostis neglecta*, but its foliage is rougher, the ligules longer, and the branches of the panicle more flexuous and less scabrous than in that species. It is probably a hybrid between *C. canadensis* and *C. neglecta*.

6. C. INEXPANSA A. Gray, Gram. et Cyp. i. no. 20 (1834). A very variable species. The following are well-marked varieties:

a. Spikelets 4–5.5 mm. long: lemma 3.5–4 mm. long: palea 2.7–3.2 mm. long....*b.*
  b. Culms solitary: panicle 15–18 cm. long, loosely flowered; its longest branches 5–6 cm. long; its first internode 4 cm. long.....Var. *typica.*
  b. Culms mostly more or less caespitose: panicle 8–14 cm. long, densely flowered; the longest branches 2–4 cm. long; its first internode 1–2.5 mm. long.....Var. *robusta.*
a. Spikelets 3–4.5 mm. long: lemma 2.5–3.5 mm. long: palea 1.7–2.6 mm. long....*c.*
  c. Sheaths bearded at the summit: awn very short, inserted above the middle of the lemma or wanting.....Var. *barbulata.*
  c. Sheaths glabrous at the summit: awn present, inserted below the middle of the lemma....*d.*
    d. Panicle compactly flowered; its branches rigid, appressed, forked and spikelet-bearing nearly to the base: glumes thick and opaque, usually purple-tinged..Var. *brevior.*
    d. Panicle more loosely flowered; its branches erect or slightly spreading in anthesis, forked and spikelet-bearing from the middle or above: glumes thin except near the keel, green, rarely purple-tinged.....Var. *novae-angliae.*

Var. **typica.** *C. inexpansa* Gray, l. c.; Torr. Fl. N. Y. ii. 445, t. 152 (1843). *C. confinis* Gray, Man. ed. 2, 547 (1856), not Nutt. *C. neglecta* var. *inexpansa* M. E. Jones, Contrib. West. Bot. xiv. 9 (1912).—Central New York and probably scattered locally throughout the Central States, and north to the Athabasca River. The writer has seen only the following: NEW YORK: Penn Yan, Yates County, *H. P. Sartwell*, 1833 (TYPE). ALBERTA: Athabasca Landing, *Hitchcock*, no. 11,429 (U. S.).

Typical *Calamagrostis inexpansa* is apparently a very local plant, differing from all other varieties in its elongate, loosely flowered panicle. It is probably a luxuriant southern extreme, found in good soil in sheltered places, of the more northern and generally distributed var. *robusta*. Forms of var. *brevior* approach it in length of panicle, but the panicle of that variety is always more densely flowered and the spikelets shorter.

Var. **robusta** (Vasey), n. comb. *C. stricta* var. *robusta* Vasey in Wheeler Rep. vi. 285 (1878). *C. hyperborea* Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 39 (1898) in part, not Lange.—New-

foundland and eastern Quebec; the Rocky Mountains south to Colorado; and in the Coast Ranges from Oregon and Washington north to Alaska. The following are typical: NEWFOUNDLAND: calcareous rocks and talus, entrance to Port Saunders Harbor, Ingornachoix Bay, *Fernald & Wiegand*, no. 2555; in gravel, Southeast Arm, Bonne Bay, *Fernald & Wiegand*, no. 2561; serpentine gravel along Blomidon Brook, Bay of Islands, *Fernald & Wiegand* no. 2560; in limestone barrens, upper slopes, alt. 200–300 m., Table Mountain, Port à Port Bay, *Fernald & Wiegand*, no. 2558. QUEBEC: sur les gneiss laurentiens de la Pointe à la Marmite, Sept-Iles, *Victorin & Rolland*, no. 18,198; rivages calcaires, Ile à la Vache Marine, Mingan Islands, *Victorin & Rolland*, no. 20,522; dry talus of slaty cliffs, northern face of Mt. St. Pierre, at mouth of Riviere à Pierre, Gaspé County, *Fernald & Smith*, no. 25,480; border of Lac Chicoté, Table-topped Mountain, *Fernald*, no. 360; sur les cailloutis du plateau, Sand-Top, Anticosti, *Victorin & Rolland*, no. 27,835. ALBERTA: Cataract Creek, near Pinto Lake, *Stewardson Brown*, no. 1484 (as *C. Suksdorfi*). MONTANA: Swan Lake, *Griffiths & Lange*, no. 119 (as *C. montanensis*). COLORADO: Twin Lakes, *John Wolfe*, 1873 (TYPE in U. S. National Herbarium). OREGON: moist meadows, Union County, *W. C. Cusick*, 1879. WASHINGTON: low ground near Spangle, Spokane County, *Suksdorf*, no. 1100. BRITISH COLUMBIA: Vancouver Island, *Rosendahl & Brandegee*, no. 77 (U. S.); British Columbia, *H. L. Bolley*, 1889 (U. S.). ALASKA: Beardslee Island, Glacier Bay, *Anderson*, no. 1185 (U. S.); Yukon River, *Dawson*, no. 97 (U. S.); lake margin, Dutch Harbor, Unalaska, *E. C. Van Dyke*, no. 218.

There is no sharp specific line separating typical *Calamagrostis inexpansa* from the American forms identified by Dr. Kearney with *C. hyperborea* Lange, of Greenland. The stoloniferous habit is general throughout the genus, and whether the culms are solitary or caespitose depends chiefly on the type of soil in which they are growing. The panicle of typical *C. inexpansa* is longer and more loosely flowered, but many intermediates occur, particularly between the typical form and var. *brevior*. It seems wisest, therefore, to include all of these forms under *C. inexpansa*, except *C. hyperborea* of Greenland, which is specifically distinct.

Var. *robusta* is the most northern in distribution of these forms. It is the common form in Newfoundland, but is more local in Quebec, and is apparently much less common in the Rocky Mountains than the forms with smaller spikelets. It is very variable in stature, habit of growth, and in the shape and color of its glumes, but on the whole constitutes a well-marked trend.

Var. BARBULATA Kearney, Bull. U. S. Dept. Agr. Div. Agrost. xi. 37 (1898). Known only from the TYPE specimen: Mason County, WASHINGTON, *Piper*, no. 947.

Var. **brevior** (Vasey), n. comb. *Calamagrostis stricta* var. *brevior* Vasey in Wheeler Rep. vi. 285 (1878). *C. stricta* A. Gray, Proc. Am. Acad. vi. 79 (1866), not Timm. *Deyeuxia neglecta* var. *americana* Vasey in Macoun, Cat. Can. Pl. iv. 206 (1888). *D. neglecta* var. *robusta* Vasey l. c. *C. robusta* Vasey, Monog. Grasses U. S., Contr. U. S. Nat. Herb. iii. 82 (1892). *C. americana* Scribn. Bull. U. S. Dept. Agric. Div. Agrost. xi. 40 (1897). *C. hyperborea elongata* Kearney, ibid. xi. 40 (1898). *C. hyperborea stenodes* Kearney, ibid. 39, in part. *C. hyperborea americana* Kearney, ibid. 40. *C. elongata* Rydb. Rocky Mt. Fl. 58 (1917). *C. wyomingensis* Gandog. Bull. Soc. Bot. France, lxvi, sér. xix. 299 (1919).—Newfoundland and eastern Quebec to northern Vermont and central New York, west to British Columbia, south in the mountains to New Mexico, Arizona, and California. The following are typical: Newfoundland: Green Gardens, Cape St. George, *K. K. Mackenzie & Ludlow Griscom*, no. 11,117; springy places, north bank of river below the falls, Grand Falls, Exploits River, *Fernald & Wiegand*, no. 4583. Quebec: wet shelf at 400 feet, Grande Coupe, Percé, Gaspé County, *Collins, Fernald & Pease*, August 19, 1904; limestone-conglomerate cliffs and ledges, Cap au Massacre, Bic, *Collins & Fernald*, July 16, 1904; alluvions près de l'embouchure, Rivière a Jupiter, Anticosti Island, *Victorin & Rolland*, no. 24,377. New Hampshire: summit of Mt. Cannon, Franconia, *William Boott*, July 8, 1870. Vermont: base of Willoughby Cliff, *E. & C. E. Faxon*, July 26, 1886. New York: shore of Lowery's Pond, Junius, *K. M. Wiegand & R. Jones*, August 3, 1917. Ontario: Mungo Park Point, Nipigon Lake, *H. E. Pulling*, 1912. Indiana: railroad track, Clarke, *L. M. Umbach*, June 27, 1896. Michigan: sphagnum bog, Mud Lake, Cheboygan County, *J. H. Ehlers*, no. 563; Isle Royale, *W. S. Cooper*, no. 192. Wisconsin: University Bay, Madison, *J. R. Heddle*, no. 2T195. Minnesota: Iowa-Minnesota line, Elmore, *L. H. Pammel*, no. 915. North Dakota: Leeds, *J. Lunell*, no. 13. South Dakota: Brookings, *J. J. Thornber*, July 1, 1893. Nebraska: on Dismal River, south of Thedford, Thomas County, *P. A. Rydberg*, June 27, 1893. Saskatchewan: Regina, *J. Fowler*, July 27, 1903. Alberta: road and prairie, Craigmyle District, *A. H. Brinkman*, no. 727; near Jasper, *J. M. Macoun*, no. 98,159; damp ground, Castle Hill District, Rosedale, *M. E. Moodie*, no. 1131. Montana: wet meadow, Sheep Creek, *P. A. Rydberg*, no. 3309; Columbia Falls, *R. S. Williams*, September 25, 1893. Idaho: open soil near the river, St. Anthony, *E. D. Merrill & W. N. Wilcox*, no. 153. Wyoming: bars of Buffalo River at Government Bridge, Teton Forest Reserve, *Merrill & Wilcox*, no. 403; Sheridan, *Elias Nelson*, no. 301. Colorado: Gunnison, *C. F. Baker*, no. 579; Fort Garland, *Vasey*, 1884. Utah: springy places, Crossman Valley, east of Lookout Mountains, *H. Engelmann*, July 20, 1859. Nevada: West Humboldt Mountains, *S. Watson*, no. 1290. Arizona: Willow Spring, *E. Palmer*, no. 616. California: Nellie Lake, Fresno

County, *F. J. Smiley*, no. 611. OREGON: one mile southeast of Keno, Klamath County, *M. E. Peck*, no. 9402. WASHINGTON: Douglas County, *Sandberg & Leiberg*, no. 525. BRITISH COLUMBIA: summit of Selkirk Mountains, altitude 4500 feet, *John Macoun*, August 2, 1890.

This is the common form throughout the Great Plains and the Cordilleran Region. It is very variable in the length and compactness of its panicle, the shape of its glumes, and in the general habit of its leaves and culms, but no definite segregates can be made. Dr. Kearney separated forms with elongate panicles and more acuminate glumes as *Calamagrostis hyperborea elongata*, but the type specimen which he cites (Dismal River, Plummer County, Nebraska, *Rydberg*, no. 1494) is hardly separable from the typical form of var. *brevior*, and the differences on which the variety is based are very inconstant, particularly the shape of the glumes, which appears to change as the spikelet matures.

A form from Bic, Quebec (*Fernald & Collins*, no. 880), has the spikelets of this variety, but the smooth foliage and short ligules of *Calamagrostis neglecta*. It may be a hybrid between these two.

Calamagrostis hyperborea stenodes Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 39, is an aggregate of forms with short, densely flowered panicles, some of which may be referred to this variety, and some may be hybrids between it and *C. neglecta*. The type specimen is clearly *C. neglecta*.

Var. **novae-angliae**, n. var., culmis solitariis erectis 11–15 dm. altis; foliis caulinis planis scabris ligulis suis 4–7 mm. longis; panicula 12–16 cm. longa angusta, ramis erectis vel ad anthesin paulo patentibus, longioribus 2–5 cm. longis, infra rectis vel paulo flexuosis, ramosis et spiculas ferentibus ad vel supra medium; spiculis 3.5–4 mm. longis; glumis acuminatis valde carinatis scabris ad apicem pallidis fuscescentibus, alibi viridibus albescentibus et translucentibus: lemmate paleaque precedenti similibus.

Culms solitary, erect, 11–15 dm. tall: cauline leaves flat, scabrous, their ligules 4–7 mm. long: panicle 12–16 cm. long, narrow; its branches erect, or somewhat spreading in anthesis; the longer 2–5 cm. long, straight below or somewhat flexuous, branched and spikelet-bearing from the middle or above: spikelets 3.5–4 mm. long: glumes acuminate, strongly keeled, scabrous, chartaceous at the tip, elsewhere pale green and faintly translucent: lemma and palea as in the preceding.—Damp woods and wet, shaded cliffs, northern New England. Specimens examined: MAINE: woods, trail from Northeast Harbor to Jordan Pond, Mt. Desert Island, *E. F. Williams & E. L. Rand*, July 19, 1899 (TYPE in Gray Herb.); Jordan Mt., Mt. Desert Island, *E. L. Rand*, July 19, 1897 (N. E.). NEW HAMPSHIRE: Crawford

Notch, Hart's Location, *A. S. Pease*, no. 16,749 (N. E.). VERMONT: high ledges, Willoughby Mt., Willoughby, *Walter Deane*, July 19, 1885.

A form preferring shady, sheltered places, apparently not calcicolous as are the other varieties of this species, and possibly more abundant in New England and the adjacent territory. The Mt. Desert material, collected in several different localities on the Island, is almost identical with that from Crawford Notch, and forms with it a well-marked variety with almost enough characters to make it a distinct species, but the specimens from Willoughby, growing together with var. *brevior*, show transitions to that variety. The glumes are considerably thinner than those of the other varieties of *Calamagrostis inexpansa*, and somewhat resemble those of *C. neglecta*, but they are paler, greener, and more scabrous, while the broad, scabrous leaves and long ligules distinguish it immediately from that species.

7. C. CRASSIGLUMIS Thurb. in S. Wats. Bot. Calif. ii. 281 (1880). *Deyeuxia crassiglumis* Vasey, Descr. Cat. Grasses U. S. 50 (1885). *C. neglecta* var. *crassiglumis* Beal, Grasses N. Am. ii. 353 (1896).—Northern California to Alaska, near the coast. Specimens examined: CALIFORNIA: swamps, Mendocino County, *Bolander*, no. 4766 (TYPE). WASHINGTON: Whatcom Lake, Whatcom County, *Suksdorf*, no. 1024. BRITISH COLUMBIA: pebbly beaches, Cowichan Lake, Vancouver Island, *C. O. Rosendahl*, no. 1866; sandy shores, Lake Karmutzen, Vancouver Island, *Dawson*, August 6, 1885. ALASKA: Amaknak Island, Unalascha, *M. W. Harrington*, October 20, 1871; without definite locality, *A. Kellogg*, no. 154.

A very well marked species. A form from Humboldt County, California, (*Kellogg & Harford*, no. 1090) has the thick glumes of this species, but has much larger spikelets, 6 mm. long, long ligules, and rough foliage, while the anthers are 2.6 mm. long, larger than in any species of this subsection. It may be a hybrid between *Calamagrostis crassiglumis* and *C. nutkaensis* Presl.

8. C. HYBERBOREA Lange, Fl. Dan. xvii. 50, t. 2942 (1880); Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 39 (1898), in part. *C. neglecta* var. *hyperborea* M. E. Jones, Contrib. West. Bot. xiv. 9 (1912), in part.—Greenland. Specimens examined: Neria, 61° 33′ lat. bor., *J. Eugenius*, July 30, 1924, and July 30, 1925; Holsteinborg, *Th. M. Fries*, August 1, 1871.

Distinguished from all varieties of *Calamagrostis inexpansa* by its leaves, smooth on the lower, scabrous only on the tip and the upper surface; short ligules; and very narrow, acuminate glumes which are frequently hyaline on the tip and the margins. The original descrip-

tion says "foliis planis, scabris," but it is probable that this referred to the upper surface only.

9. C. LABRADORICA Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 38 (1898).—Southern Labrador, south along the northern shore of the Gulf of St. Lawrence to Anticosti Island. Specimens examined: QUEBEC: Bonne Espérance, *J. A. Allen*, no. 18 (TYPE U. S.); Bradore, Saguenay County, *Fernald & Wiegand*, no. 2551; Vielle Romaine, Archipel Ouapitagone, *H. St. John*, no. 90,125 (distributed as *C. hyperborea*); Ilêts de la Baie à Jean, *Victorin & Rolland*, no. 18,197; Natashquan, *Fernald & Long*, no. 27,496 (as *C. neglecta* var. *borealis*); sur les gneiss laurentiens du rivage, Magpie, *Victorin & Rolland*, nos. 18,242 and 18,541 (as *C. neglecta* var. *borealis*); Pointe Sud-Ouest, Anticosti, *Victorin & Rolland*, nos. 24,383 and 27,482 (as *C. neglecta*). The specimen from Fox Harbor, Labrador, (*J. A. Allen*, 1882) cited by Kearney has not been seen by the writer.

Intermediate between *Calamagrostis inexpansa* var. *robusta* and *C. neglecta*. It has in general the spikelet-characters of the former, but the glumes are more lustrous and less scabrous. The habit, foliage, and ligules resemble *C. neglecta*. The type specimen, and others from the northern part of the range of the species have a much interrupted panicle with very short branches, but forms from farther south with the same habit and spikelet-characters have a more compact, somewhat shorter panicle.

11. C. NEGLECTA (Ehrh.) Gaertn., Meyer & Scherb. Fl. Wetterau, 94 (1799). Very variable. The following are sufficiently marked to be classed as varieties.

a. Spikelets 3–5 mm. long: glumes sharply acute or acuminate . . . . . *b.*
  b. Culms 3–10 dm. high: panicle 5–15 cm. long: callus-hairs ½–¾ the length of the lemma: awn inserted ¼–⅓ of the way up the lemma . . . . . *C. neglecta* (typical).
  b. Culms 1–4 dm. high: panicle 2–5 cm. long: callus-hairs ¼–½ the length of the lemma: awn inserted ⅓–½ the way up the lemma . . . . . Var. *borealis*.
a. Spikelets 2–2.6 mm. long: glumes obtuse or merely acute . . . Var. *micrantha*.

C. NEGLECTA (Ehrh.) Gaertn., Meyer & Scherb. l. c., as to name-bringing synonymy. *Arundo neglecta* Ehrh. Beitr. vi. 84, 137 (1791). *A. stricta* Timm. in Siemss. Meckl. Mag. ii. 235; ex Schrad. Fl. Germ. 215 (1806). *C. stricta* Koel. Descr. Gram. 105 (1802). *Deyeuxia neglecta* Kunth, Rev. Gram. i. 76 (1835). *C. coarctata* Hook. Fl. Bor.-Am. ii. 240 (1839). *C. lapponica* A. Gray, Proc. Am. Acad. vi. 78 (1866) in part. *Deyeuxia neglecta brevifolia* Vasey in Macoun, Cat. Can. Pl. iv. 206 (1888). *C. neglecta Wrightii* Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 36 (1898). *C. californica* Kearney, ibid. 37. *C. hyperborea stenodes* Kearney, ibid. 29, in part.—Northern Eurasia, and in America from Greenland and Labrador to Alaska, south to

Nova Scotia, New Brunswick, northern Maine, Wisconsin, Colorado and California. The following are typical: Greenland: Quagssiarssuk, Igaliko-Fjord, 60° 53′ N., *A. E. Porsild & M. P. Porsild*, August 5, 1925 (as *C. hyperborea* Lange). Labrador: on sandy bank of White Bear River, Sandwich Bay, *R. H. Woodworth*, no. 61. Newfoundland: gravelly and turfy strand near Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss*, no. 27,491; boggy barren south of Ship Cove, Sacred Bay, *Fernald, Wiegand & Long*, no. 27,492. Quebec: swales along Blanc Sablon River, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 27,495; tourbière humide, Ile à la Chasse, Mingan Islands, *Victorin & Rolland*, no. 24,381; sur les platieres, Rivière York, Gaspé County, *Victorin et al.*, no. 17,802; margin of cold brook, mouth of Bonaventure River, Bonaventure County, *Williams & Fernald*, July 31, 1902; dans la grande prairie saumâtre, Lac Salé, Anticosti, *Victorin & Rolland*, no. 27,840; bogs and ponds between East Cape and East Point, Coffin Island, Magdalen Islands, *Fernald et al.*, no. 6860. Prince Edward Island: brackish marsh, Green's Shore, Summerside, *Fernald & St. John*, no. 6858. New Brunswick: wet, marshy land, Shediac Cape, *F. T. Hubbard*, no. 705; river gravels, St. John River, Woodstock, Carleton County, *Fernald & Long*, no. 12,635. Nova Scotia: springy swales south of Amherst, Cumberland County, *Fernald*, no. 19,430. Maine: strand of Aroostook River, Fort Fairfield, Aroostook County, *R. W. Woodward & C. H. Bissell*, July 11, 1914. Wisconsin: Menekaunee, *J. H. Schuette*, June 26, 1892 Minnesota: Middle Lake, *C. A. Ballard*, June 1892. Saskatchewan: marshes near Boulder Lake, *John Macoun & Wm. Heriot*, no. 77,147 (U. S.). Alberta: swamp, Banff, *A. S. Hitchcock*, no. 11,476 (U. S.) (as *C. inexpansa*). Montana: borders of streams, *F. L. Scribner*, July, 1883 (U. S.). Idaho: Montpelier, *T. A. Williams*, no. 2521. Wyoming: Bull Camp, Crazy Woman's Creek, 7500–8000 ft., *T. A. Williams*, no. 2768 (as *C. hyperborea*); Black Rock Springs, Sweetwater County, *Aven Nelson*, no. 3717 (as *C. americana*). Colorado: Rocky Mountains, lat. 39°–41°, *Hall & Harbour*, no. 649. California: Sierra County, *J. G. Lemmon*, no. 444 (type of *C. californica* Kearney). Oregon: Big Meadow, Des Chutes River, *J. R. Leiberg*, no. 522. Washington: Marshall Junction, *C. V. Piper*, no. 2254. British Columbia: Terrace, Skiva River, *J. K. Henry*, no. 17 (U. S.). Yukon Territory: Bear Creek, near Lake Desert d'Asch, *Adolf Mueller*, August 6, 1920. Alaska: Glacier Bay, *Walker*, no. 826.

Variable in height, length and breadth of leaves, and size of panicle. It is sometimes too close to the varieties with small spikelets of *Calamagrostis inexpansa*, but can usually be distinguished by its leaves which are smooth on the lower surface, its short ligules, and its thinner, more translucent glumes, although intermediates occasionally occur in all these characters. The western forms have generally

rougher foliage, although agreeing with true *C. neglecta* in all other characteristics.

Var. BOREALIS (Laestad.) Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 35 (1898). *Arundo groenlandica* Schrank, Regensb. Denkschr. ii. 8 (1818). *C. groenlandica* Kunth, Rev. Gram. i. 79 (1829). *C. borealis* Laest. Bidr. Vaextl. Torn. Lappm. Ups. 44 (1860). *C. stricta* var. *borealis* Hartm. Skand. Flor. ed. 11, 517 (1879). *Deyeuxia vancouverensis*, Vasey, Bull. Torr. Club. xv. 48 (1888). *Deyeuxia borealis* Macoun, Cat. Can. Pl. iv. 207 (1888).—Arctic regions, south in North America to Labrador, Newfoundland and James Bay. The following are typical: GREENLAND: Atanikerdluk, lat. 70° 2′ *A. E. Porsild*, August 10, 1921; Millenfjordens Bund, *A. E. Porsild*, August 11, 1923; Disco, *M. P. Porsild*, August 16, 1902. LABRADOR: Bowdoin Harbor, *C. S. Sewall*, no. 133; Nain, *Sewall*, no. 96; Anatolak, *Sewall*, no. 429. NEWFOUNDLAND: Burnt Cape, Pistolet Bay, *Fernald & Long*, no. 27,490; Capstan Point, Flower Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 26,270; Grand Lake, *Waghorne*, no. 61.

Except for its small size and short panicle, the characters separating this variety from the typical form are very unreliable, although it represents a sufficiently well-marked tendency to be separated as a variety. Schrank's *Arundo groenlandica* is undoubtedly the same, but it is not, as Steudel suggests, the same as Steudel's *Calamagrostis hirtigluma*, which he describes as a larger plant, with flat leaves, a panicle 3–4 inches (7–10 cm.) long, and which is very likely *C. canadensis* var. *Langsdorfi*, although his description is wholly inadequate.

Var. **micrantha** (Kearney), n. comb. *C. micrantha* Kearney, Bull. U. S. Dept. Agric. Div. Agrost. xi. 36 (1898). *C. micrantha* var. *sierrae* M. E. Jones, Contrib. West. Bot. xiv. 9 (1912)?—Wisconsin and Saskatchewan locally west to California, north to Yukon Territory. Specimens examined: WISCONSIN: Madison, *T. J. Hale*, 1860. NORTH DAKOTA: Pleasant Lake, Pierce County, *J. Lunell*, no. 22. ALBERTA: Athabasca Landing, *Hitchcock*, no. 11,431 (U. S.). COLORADO: Steamboat Spa, *Shear & Bessey*, no. 1351. OREGON: Farwell Bend, Crook County, *J. B. Leiberg*, no. 463; Devil's Lake, *A. S. Hitchcock*, no. 23,490 (U. S.). YUKON TERRITORY: along Yukon River, Whitehorse, *Hitchcock*, no. 2943 (U. S.).

Calamagrostis micrantha Kearney does not seem specifically distinct from *C. neglecta*, as intermediates are found both in size and shape of the glumes and in the breadth of the panicle. The writer has not seen material of var. *sierrae* M. E. Jones, and it may be varietally distinct, although the characters given are not reliable ones. The specimen from Farwell Bend, Oregon (*J. B. Leiberg* 463) has longer panicle-

branches, and a very short or obsolete awn, and may correspond with this variety, but the writer does not feel justified in separating it without seeing more material.

C. neglecta var. *candidula* Kearney, Bull. U. S. Dept. Agr. Div. Agrost. xi. 35, with pale scabrous leaves, long ligules, pale glumes, a distinctly bent, though not twisted awn, and the lemma nearly equalling the palea, clearly does not belong to this species, and is probably an aberrant form of *C. montanensis* Scribn.

11. C. LAPPONICA (Wahlenb.) Hartm. Skand. Fl. ed. 1, 46 (1820). *Arundo lapponica* Wahlenb. Fl. Lapp. 27, t. i. (1812).—A species of northern Europe, represented with us by:

Var. **brevipilis**, n. var., a forma typica differt pilis brevioribus ⅔ longitudine lemmatis; innovationibus pluribus.

Callus-hairs short, ⅔ the length of the lemma: innovations numerous.—QUEBEC: abundant in sand or bogs on the gneiss plain, Blanc Sablon, Straits of Belle Isle, *M. L. Fernald & K. M. Wiegand*, no. 2547 (TYPE in Gray Herb.).

Calamagrostis lapponica is intermediate in its characters between all three of the divisions of the *Quinquinerviae*. The typical form has the long copious hairs of § *Calamagris*, while it has the thick lemma of § *Deyeuxia*, with the short palea of the subsection *Orthoatherae*, and a bent, slightly geniculate awn, approaching that of the subsection *Ancylatherae*, although the awn is not twisted at the base, as it is in the species of that subsection. Dr. Eric Hultén (Fl. Kamtchat. 107) implies that its pollen is sterile, which leads to the supposition that its intermediate characters may be due to hybridization. The American form, with its short, unequal callus-hairs, belongs clearly in § *Deyeuxia*.

The writer has not seen material of *Calamagrostis lapponica* var. *groenlandica* Lange, Consp. Fl. Groenl. ii. 296 (1887), described as differing from the European form in its short callus-hairs and straight awn, but it seems doubtful that with those characters it could be placed in this species. It may be an aberrant form of *C. neglecta* or *C. hyperborea*, or, as suggested above, *C. canadensis* var. *arcta*.

In concluding, the writer gratefully acknowledges the invaluable aid of Professor M. L. Fernald, under whose direction this work was carried out. He also expresses his gratitude to Professor A. S. Hitchcock, for his assistance in giving access to the specimens in the National Herbarium, to Dr. M. O. Malte, for his generous loan of a type-sheet, and to Miss Sanderson, librarian at the Gray Herbarium for her aid in securing obscure literature.

Explanation of Plate 195

Fig. 1, Calamagrostis canadensis, spikelet × 5, from Kennebunkport, Maine, *G. G. Kennedy*. Fig. 2, C. canadensis var. robusta, spikelet × 5, from Sand Bank, west of Burgeo, Newfoundland, *Fernald, Long, & Fogg*, no. 91. Fig. 3a, C. canadensis var. Langsdorfi, spikelet × 5, from Tunugliarfik-Fjord, Kiagtût, Greenland, *A. E. Porsild & M. P. Porsild;* fig. 3b, panicle × ½, fig. 3c, ligule × 2. Fig. 4, *C.* Scribneri, spikelet × 5, from near Pagosa Peak, Colorado, *C. F. Baker*, no. 160. Fig. 5a, C. canadensis var. arcta, panicle × ½, type specimen from head of Nachvak Bay, Labrador, *R. H. Woodworth*, no. 62; fig. 5b, ligule × 2. Fig. 6a, C. inexpansa var. brevior, panicle × ½, from base of cliffs, Mt. Willoughby, Vermont, *E. & C. E. Faxon;* fig. 6b, spikelet × 5. Fig. 7a, C. inexpansa var. novae-angliae, panicle × ½, type specimen from woods, Mt. Desert Island, Maine, *E. F. Williams & E. L. Rand;* fig. 7b, spikelet × 5; fig. 7c, ligule × 2. Fig. 8, C. hyperborea, spikelet × 5, from Neria, Greenland, *J. Eugenius*. Fig. 9, C. lapponica var. brevipilis, spikelet × 5, type specimen from Blanc Sablon, Quebec, *Fernald & Wiegand*, no 2547. Fig. 10, C. labradorica, spikelet × 5, from Magpie, Quebec, *Victorin & Rolland*, no. 18,242. Fig. 11a, C. neglecta, spikelet × 5, from mouth of Bonaventure River, Quebec, *Williams & Fernald;* fig. 11b, ligule × 2.

(To be continued)

NOTES FROM THE HERBARIUM OF THE UNIVERSITY OF WISCONSIN—V

Norman C. Fassett

Scirpus heterochaetus Chase. Although local, this species is abundant in a few places in Wisconsin. In Lake Puckaway, Green Lake County, it covers many acres, growing in shallow water with *S. validus* and *S. acutus*. It is represented by the following collections: north side of Lake Puckaway, *F. M. Uhler & W. T. McLaughlin* no. 355; south side of Lake Puckaway, Marquette, *Uhler & McLaughlin* nos. 356 & 357. Mr. Uhler tells me that he has seen it in several places along the Mississippi River bottoms in this state, but we have only one collection from that region. This is from Pepin, *N. C. Fassett & L. R. Wilson* no. 4351. Here it grew in one large colony bordering a small lake separated from Lake Pepin by a sand bar. I have also taken it in Burnett Co.: sandy shore of Long Lake, Hertel, *Fassett* no. 7795. Here it was apparently not abundant.

Echinochloa Walteri (Pursh) Nash. The range of this species was reported in Gray's Manual, ed. 7, as from "N. H. to Fla.; and in w. Ont. and n. Ill." Hitchcock, in 1920,[1] extended this range northwestward by citing a specimen from Sauk City, Wisconsin,

[1] Contrib. U. S. Nat. Herb. xxii. pt. 3, 139 (1920).

and the next year Wiegand[2] cited a specimen as "Wisconsin: 1861, *T. J. Hale.*" Hale's collection was probably from the vicinity of Madison, where this species is represented by many collections, including the following: Dead Lake [Lake Wingra], August, 1885, *L. H. Pammel;* Dead Lake, September 19, 1890, *R. H. True;* University Bay [part of Lake Mendota], September 1, 1909, *J. R. Heddle* no. 2T269; University Bay, September 20, 1916, *E. A. Baird;* University Bay, September 7, 1920, *J. J. Davis.* The writer has seen it at both of these localities in recent years, as well as on Lake Waubesa a few miles south of Madison.

E. Walteri was excluded from the flora of Minnesota by Rosendahl and Butters,[2] but the writer has collected it in Wabasha County, Minn., in a quaking bog on the Mississippi River bottoms: Weaver, *N. C. Fassett & N. Hotchkiss* no. 2906. It was also found (in this case f. *laevigata* Wiegand) by Mr. W. T. McLaughlin near the Minnesota line: sandy shore of Yellow Lake, Webster, *McLaughlin* no. 358. Mr. A. M. Fuller writes me of a sheet in the Milwaukee Public Museum: Mississippi River bottoms, Grant County, Wisconsin, *H. H. Smith.*

The occurrence of this essentially coastal plain species in three localities in the unglaciated area (Sauk City, on the Wisconsin River; Weaver, Minnesota, and Grant County, Wisconsin, on the Mississippi River) is interesting in view of the hypothesis that such plants followed the glacial margin in their migrations westward.[3] Did it follow the terminal moraines across southeastern Wisconsin until it reached the Wisconsin River, then spread down that stream, up the Mississippi and even up the St. Croix to Yellow Lake? It is decidedly rare along all these rivers.

The Fox River, flowing into Lake Michigan, heads near Portage, Wisconsin, so close to the Wisconsin River that a canal is maintained between the two streams. The route of Marquette and Joliet on their first voyage to the Mississippi was up the Fox and down the Wisconsin Rivers. The Fox River, as a possible route for coastal plain migrants, was visited in the fall of 1929. Here, in company with such plants as *Bidens discoidea*, *Juncus Greenei*, and the typical *Zizania aquatica*,[4] were found extensive swales of the *Echinochloa*.

[1] Rhodora xxiii. 62 (1921).
[2] Minnesota Botanical Studies iv. 467 (1916).
[3] See Peattie, Rhodora xxiv. 57–70,80–88 (1922).
[4] See Rhodora xxvi. 156 (1924), and xxix. 228 (1927)

The following collections were made, in each case on the shores of natural enlargements of the Fox River: MARQUETTE Co.: margin of Buffalo Lake, Montello, *Fassett* no. 8830. GREEN LAKE Co.: north shore of Lake Puckaway, *Fassett* no. 8829; south shore of Lake Puckaway, Marquette, *Fassett no.* 8801.

Other collections in Wisconsin, all in the southeastern part, are: MILWAUKEE Co.: Bay View, *F. Runge*.[1] DODGE Co.: Fox Lake, *H. L. Ward;*[1] Horicon Marsh, Horicon, *Fassett* no. 8831.

GALIUM BOREALE L., var. TYPICUM Beck von Man. In Wisconsin as follows: SAUK Co.: marshy uplands, Baraboo, July 7, 1891, *R. H. True*. DANE Co.: near R. R., abundant, South Madison, June 2, 1903, *Pauly*. "The only specimens in the Gray Herbarium and the herbarium of the New England Botanical Club from east of Manitoba are one each from northern New Hampshire, northern Vermont and northern New York."[2]

BIDENS CORONATA (L.) Britton; not Fisch. (*B. trichosperma* (Michx.) Britton). Reported in Gray's Manual, ed. 7, from "Mass. to Va. near the coast; also N. Y. to Ill. and Ky.; said to extend northwestw. to Minn.," this plant proves to be abundant in wet places across the southern half of Wisconsin, occurring northward as far as Clark and Shawano Counties. *B. aristosa*, reported as from "O. to Mich., Minn., and southwestw.", a range which seems to include southern Wisconsin, appears to be absent from this state. Of the many herbarium sheets here and at the Milwaukee Public Museum, marked *B. aristosa*, all that bear mature fruit are clearly *B. coronata.*

MADISON, WISCONSIN.

THE AUSTIN COLLECTION FROM THE LABRADOR COAST

HARLOW BISHOP

DURING the summer of 1928, Dr. Oliver L. Austin of Tuckahoe, New York conducted a third expedition to the coast of Labrador. An intensive survey of the bird fauna of the outside islands, the large number of which lends hazard to navigation in this part of the world, formed the guiding motive of the venture. Oliver L. Austin, Jr., a

[1] Specimen in the Herbarium of the Milwaukee Public Museum.
[2] Fernald, RHODORA XXX. 107 (1928).

student of ornithology at Harvard University, made a critical collection of the rare and interesting birds of the coast, but concentrated particularly on the banding of young birds, in order to secure new data on migrational routes.[1] The writer was fortunate to be a member of the party and to be privileged to make a parallel survey of the flora, under the authorization of the Gray Herbarium.

Twenty stations were the site of collections along the southern and central parts of the coast, from Battle Harbor (lat. 52° 15′, long. 55° 35′) on the south to Tikkoatokok Bay (lat. 57°, long. 62°) on the north, representing a stretch of some four hundred miles. From all but relatively few of these, previous collections have been made. The long and finely discriminating activities of the Moravian missionaries, since the inception of their influence in 1732, though chiefly at Hopedale, at Nain and at Okkak, have contributed greatly to our knowledge of the flora of Labrador.[2] The number of additions to the flora, that have been made as a result of the present expedition, was therefore not large, but the weather was so favorable that nearly two thousand sheets of material were brought back for examination and exchange.

The vegetation shows, in exposed situations, the general depressed habit of the crowberry, *Empetrum nigrum*, and the bearberry, *Arctostaphylos alpina*, but becomes a low forest of black spruce, *Picea mariana*, with a dense lichen turf, mostly of *Cladonia alpestris*, in sheltered valleys. The conspicuous Canadian character of the flora of at least this section of the coast is in line with what one would expect from the physiographic history of the region. The age, origin and affinities of the flora appear to have a definite relation to the extensive glaciation in recent geologic times. The potency of this factor is easy to see in the almost total absence of soil, the low, rounded hills of essentially uniform height and the countless boulders everywhere to be seen. The rarity of such forms as *Puccinellia tenella*, *Dupontia micrantha*, and *Koenigia islandica* would seem to point to the disappearance of the older arctic flora of the region, and the dominance of such forms as *Picea mariana*, *Abies balsamea*,

[1] The results have been summarized in a preliminary way in "Migration Routes of the Arctic Tern," O. L. Austin Jr., Bull. Northeastern Bird-Banding Assoc., Vol. IV, No. 4, Oct., 1928.

[2] The first critical notes on the flora of Labrador, based on these collections, were published by R. R. von Schranck as "Aufzählung einiger Pflanzen aus Labrador, mit Anmerkungen." Denkschriften der König-Baier. Bot. Gesellschaft, Zweite Abt., 1815. Regensburg.

Calamagrostis canadensis var. *robusta*, *Carex brunnescens*, *C. leptalea*, *C. vaginata*, *Juncus filiformis*, *Streptopus amplexifolius*, *Habenaria dilatata*, *Alnus crispa*, *Coptis groenlandica*, *Drosera rotundifolia*, *Ribes glandulosum*, *Amelanchier Bartramiana*, *Viola pallens*, *Cornus canadensis*, *Trientalis borealis*, *Menyanthes trifoliata* var. *minor*, *Viburnum pauciflorum*, and *Solidago macrophylla* var. *thyrsoidea*, points to the invasion of a more southern flora. A parallel case has been proved for the flora of Europe, where the glaciations were even more protracted and more devastating to the original flora than in northern America. But the efficacy of this factor in the distribution of plants has been set forth most clearly by the intensive study of the flora of Newfoundland and of the Gaspé Peninsula.[1] The spread northward of Canadian types at the close of Pleistocene times thus appears to be the main clue to the origin of the Labrador flora.

The present collection was identified at the Gray Herbarium, Harvard University, under the direction of Professor M. L. Fernald. The following numbers have been considered by him worthy of note.

No. 55. HIEROCHLOE ODORATA (L.) Wahlenb. var. FRAGRANS (Willd.) Richter. This is the common vanilla grass, but represents a slight northern extension from the Straits of Belle Isle to Petty Harbor (lat. 52° 25′, long. 55° 40′).

No. 70. DANTHONIA INTERMEDIA Vasey. A species with unusually large spikelets and a disrupted range, known from the Rocky Mountains to the Pacific, in Kamtchatka, on the Shickshock Mountains of Gaspé and the mountains of western Newfoundland. This is the first station north of Newfoundland, at Mokkovik (lat. 55° 10′, long. 59° 15′).

No. 86. PUCCINELLIA TENELLA (Lange) Holmb. This dwarf, tufted grass, originally described from Nova Zembla and subsequently recorded from Greenland and from Cape Chidley in northernmost Labrador, was found on a small rock island, fifteen miles northeast of Ford Harbor (lat. 57°, long. 62°), thus extending its range south from Cape Chidley.[2]

No. 101. ELEOCHARIS UNIGLUMIS (Link) Schultes. A circumpolar species which has been but recently recognized in America. Its collection at Paradise River, Sandwich Bay (lat. 53°, 30′, long. 57°, 15′) furnishes the most northern material in extreme eastern America.

Nos. 111 and 111b. CAREX GYNOCRATES Wormsk. The range of this diminutive sedge in continental eastern America has been extended considerably northward from the Straits of Belle Isle to Hopedale (lat. 55° 27′, long. 60° 12′).

[1] For a significant discussion of these regions see M. L. Fernald, "Persistence of Plants in Unglaciated Areas of Boreal America." Mem. Amer. Acad. of Arts and Sciences, Vol. XV, No. 111, 1925.

[2] Simmons, H. G. Phytogeogr. Arct. Am. Archipel. 52, 1913.

No. 113. Carex exilis Dewey. A common sedge to the south, its known range now extended northward from the Straits of Belle Isle to Makkovik (lat. 55° 10′, long. 59° 15′).

No. 141. Carex livida (Wahlenb.) Willd. var. Grayana (Dewey) Fernald. The range extended northward from the Straits of Belle Isle to Makkovik (lat. 55° 10′, long. 59° 15′).

No. 166. Carex Lyngbyei Hornem. The purple-black spikes of this coarse sedge render it particularly conspicuous at Gready Island (lat. 53° 50′, long. 56° 20′). It is widely dispersed in northern Eurasia but has heretofore been known in America only from Greenland and from Alaska to Oregon.

No. 179. Juncus arcticus Willd. This species has been known from arctic regions, the shores of Hudson Bay, and from Alaska to Alberta. This is a southern extension from Baffin Land to the Fraser River (lat. 57°, long. 62°).

No. 230a. Corallorhiza trifida Chatelain. This species of coral root has not been known north of Newfoundland and its present collection represents an extension northward in range to Hopedale (lat. 55° 27′, long. 60° 12′).

No. 275. Alnus incana (L.) Moench. A common alder of New England and eastern Canada, its known northern limit is extended from the northern shore of the Gulf of St. Lawrence to Paradise River, Sandwich Bay (lat. 53° 30′, long. 57° 15′).

No. 334. Roripa hispida (Desv.) Britton var. glabrata Lunell. Extended north from the north shore to the Gulf of St. Lawrence to Paradise River, Sandwich Bay (lat. 53° 30′, long. 57° 15′).

No. 525. Veronica scutellata L. The present specimens of this purple-flowered herb represent the dwarf northern extreme of the species. Their collection at Tikkoatokok Bay (lat. 57°, long. 62°), records it for the first time from the Labrador peninsula, the previous northeastern records being from Newfoundland.

No. 590. Aster foliaceus Lindl. var. frondeus Gray. The former eastern range of this variety, characteristic of the Rocky Mountains, the Gaspé Peninsula, and western Newfoundland, has been extended north to Makkovik (lat. 55° 10′, long. 59° 15′).

No. 592. Antennaria isolepis Greene. The station at Cape Harrigan (lat. 55° 50′, long. 60° 20′) is slightly south of the previously known southern limit at Port Manvers.

No. 608. Hieracium groenlandicum Arvet-Touvet. The frequency of this species of hawkweed along Labrador, and on Newfoundland and Anticosti Island, calls into doubt its consideration as an endemic of Greenland. The present material was collected at September Harbor (lat. 57°, long. 62°).

Harvard University.

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Farlow Bot Lab

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Photo. by H. M. Raup and A. N. Steward.

Bromus: figs. 1–3, B. Dudleyi; fig. 4, B. ciliatus, var. genuinus; fig. 5, B. ciliatus, var. intonsus; fig. 6, B. Porteri; fig. 7, B. Kalmii; fig. 8, B. ramosus; all × 1¾.

Rhodora

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Vol. 32. April, 1930. No. 376.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. LXXXVII

(*Continued from p. 57.*)

IV. THE COMPLEX BROMUS CILIATUS

M. L. Fernald

(Plate 196)

Bromus **Dudleyi**, n. sp. (Tab. 196, figs. 1–3). Planta noncaespitosa vel plus minusve caespitosa 0.4–1.2 m. alta; culmis erectis glabris nodis sparse breviterque pilosis; foliis caulinis plerumque 6 late linearibus utrinque glabris vel paginis superioribus villosis, vaginis glabris vel rare villosis, laminis mediis 1–2.5 dm. longis 4–12 mm. latis; paniculis lanceolatis vel ovatis laxe ramosis 0.6–2 dm. longis, ramis filiformibus scabris remotis adscendentibus vel patentibus vix pendulis; spiculis lanceolato-oblongis vel anguste ellipticis 2–2.5 cm. longis 5–9 mm. latis 4–7-floris; glumis planiusculis vix conduplicatis submembranaceis, marginibus scariosis purpureo- vel aeneo-tinctis; gluma inferiore lanceolata acuta vel attenuata late costata, costa laevi vel scabra; gluma superiore oblongo-lanceolata obtusa vel subacuta plerumque breviter aristata valde lateque 3 (rarissime 5)-costata, costis brunneis vel purpurascentibus; lemmatibus planiusculis submembranaceis anguste oblongis aristis exceptis 1–1.2 cm. longis 2.3–3 mm. latis purpurascentibus aeneis vel rare virescentibus obtusis vel subacutis apice aristatis arista scabra 2–4 mm. longa, paginis dorsalibus 3–5-nervatis in parte extra nervos laterales valde villoso-hirsutis ad vel supra medium; palea plana oblonga quam lemma breviore, marginibus infra apicem plerumque scariosis 0.5–0.7 mm. latis integris, nervis ciliolatis infra a marginibus et a medio sub-aequidistantibus ad apicem versus marginalibus; antheris 1–2 mm. longis; caryopsibus oblongo-lanceolatis 8 mm. longis 1.6 mm. latis, latere ventrali valde costato.—Newfoundland to British Columbia, south to Nova Scotia, northern and western New England, New

York, Michigan, Minnesota and Montana. Newfoundland: bushy swale along Deer Brook, Bonne Bay, August 26, 1929, *Fernald, Long & Fogg*, no. 1223 (type in Gray Herb.); boggy thickets, Birchy Cove (Curling), *Fernald, Wiegand & Kittredge*, no. 2624 (in part); gravelly railroad embankment, Grand Falls, *Fernald, Wiegand & Darlington*, no. 4679; gravelly thickets along Harry's River, *Fernald & Wiegand*, no. 2617; wet runs and boggy spots in limestone barrens, Table Mountain, Port à Port Bay, *Fernald, Wiegand & Kittredge*, no. 2619. Quebec: wet thicket, Ile du Havre, Mingan, *St. John*, no. 90,166; alluvial thickets, Dartmouth River, August 26 & 27, 1904, *Collins, Fernald & Pease;* gravel of River Ste. Anne des Monts, August 3–17 1905, *Collins & Fernald;* alluvial islands at the mouth of Bonaventure River, August 4, 1904, *Collins, Fernald & Pease:* alluvial thickets and low wooded river-banks, Little Cascapedia River, July 29 & 30, 1904, *Collins, Fernald & Pease;* Kondiaronk, Lac Saint-Jean, *Victorin*, nos. 15,265, 15,266; Lac Noir, Co. Megantic, *Victorin*, no. 11,369. Prince Edward Island: damp thicket, Indian River, *Fernald, Long & St. John*, no. 6931. Nova Scotia: gravelly thicket, Uniacke Lake, *Fernald, Bartram & Long*, no. 23,335. Maine: dry field, outlet, Pleasant Pond, *Collins & Chamberlain;* moist soil, Beddington, September 2, 1924, *Knowlton;* wet place, Rockland, *C. A. E. Long*, no. 660; river-thickets, Sydney, *Fernald & Long*, no. 12,718. New Hampshire: boggy meadow, Clarkesville, *Fernald & Pease*, no. 17,050; moist woods, Glen Ellis, Pinkham Notch, July 23, 1921, *Knowlton;* damp woods, Melvin Village, August 23, 1904, *M. A. Day*. Vermont: damp place, Townshend, July 25, 1903, *Blanchard*. Massachusetts: edge of woods, Sherborn, *M. L. Loomis*, no. 1360; roadside, Princeton, August 9, 1894, *J. F. Collins;* Ashfield, August 3, 1909, *E. F. Williams* (type of *B. ciliatus*, forma *denudatus*); Heath, July 17, 1909, *E. F. Williams;* roadside thicket, Tolland, *F. C. Seymour*, no. 335; open bog, Lanesboro, August 4, 1920, *R. Hoffmann*. Connecticut: Hampton, August 11, 1888, *Chas. Wright* (with comment: "lower glume with faint lateral nerves"); dry bank, Lisbon, August 26, 1902, *C. B. Graves*. New York: open sedgy bog, Round Marshes, Cortland, *Eames & MacDaniels*, no. 159; boggy meadow near headwaters of Beaver Brook, Cortland, *F. P. Metcalf*, no. 5814 (distributed as *B. ciliatus*, var. "Very characteristic bog form"); open moor of Lowery's Pond, Junius, *Metcalf*, nos. 1727 and 5815 ("Swamp variety"); Ontario: Leamington, *J. Macoun*, no. 26,058. Michigan: swamps, Keweenaw Co., *Farwell*, no. 562a (with note: "hairs of glumes *spreading*, not *appressed*"). Minnesota: Muskoda, Red River Valley, *Ballard*, no. 3075. Saskatchewan: margins of lakes and streams, Moose Mountain Lake, August 5, 1883, *J. Macoun*. Montana: East Gallatin swamps, *Rydberg*, no. 3170. British Columbia: Mile 81, Pacific Great Eastern Ry., *J. M. Macoun*, no. 94,021.

Bromus Dudleyi has been confused with and usually distributed as

B. ciliatus L.; but *B. ciliatus*, the commonest species of thickets and borders of woods in eastern Canada and the northeastern States has, when well developed, a larger and greener panicle with more pendulous branches. Its well developed spikelets (FIGS. 4 and 5) are so open as plainly to show the slender rhachilla, while in *B. Dudleyi* the lemmas are so approximate that the short internodes of the rhachilla are difficult to see. *B. Dudleyi* matures early. Of the 60 sheets before me not one has young or freshly flowering spikelets; all are in fruit or so mature that the spikelets are disintegrating and nearly all were collected at dates ranging from July 17 through August, with only four (overripe) collections in the first half of September. *B. ciliatus*, on the other hand, as shown by a very extensive series, especially from Newfoundland and eastern Canada and New England, is rarely in anthesis before the middle of July, when *B. Dudleyi* is becoming mature. The large representation of *B. ciliatus* before me shows that in New England, eastern Canada and Newfoundland it is in flower (the spikelets not readily disintegrating) from mid-July into September, and that the fruiting material had been collected from August 11 through September.

In habitat *Bromus Dudleyi* shows a marked preference for (though not restriction to) limy or neutral bogs and wet thickets, being specially characteristic of the calcareous regions of Newfoundland, the Mingan Islands, the Gaspé Peninsula, western New England, central New York, etc. It is the plant which the late W. R. Dudley specially designated in his Cayuga Flora, as

> 1256. **B. ciliatus,** L. var. ——, approaching some of the Rocky Mt. forms (according to Dr. Vasey,) occurs in our sphagnum bogs or wet meadows. The plants are low, light-green; the panicle peculiarly chaffy in appearance, light-colored, and the flowering glumes smooth on the back but strongly ciliate. It is abundant, in Round Marshes, along Locke Pond and elsewhere.[1]

Its occurrence in the calcareous bogs of central New York was again emphasized by Wiegand, who mistook the bog-plant for *Bromus ciliatus:* "In central New York *B. ciliatus* is generally an inhabitant of marl springs and calcareous boggy places. In other portions of its range it does not seem to be confined to boggy places or even to calcareous situations, yet no structural difference is apparent between the New York material and that from elsewhere."[2] And later, Wiegand & Eames referred to this early-maturing plant of wet habitats as growing

[1] Dudley, Cayuga Fl. 129 (1886).
[2] Wiegand, RHODORA, XXIV. 91 (1922).

in the Cayuga Basin in "Boggy meadows and springy places, in marl or strongly calcareous soils; frequent. July–Aug."[1]

When he published *Bromus ciliatus*, forma *denudatus* Wiegand, Rhodora. xxiv. 91 (1922), Wiegand merely distinguished from *B. ciliatus* with sheaths villous the plants with sheaths glabrous and he separated off in the Gray Herbarium two covers full of such specimens (most of them with all the spikelet-characters of *B. ciliatus*), stating that the smooth-sheathed form occurs "Throughout the range of the typical form"; but he specially designated as the type a single specimen "Ashfield, Massachusetts, 1909, *E. F. Williams.*" The type-specimen was an unfortunate selection, for it is an over-ripe specimen with the spikelets completely disintegrated. It was collected on August 3d and the fragments seem to indicate that the type of forma *denudatus* belongs to *B. Dudleyi*. Somewhat later, still not understanding the differences in the spikelets which separate *B. Dudleyi* and *B. ciliatus*, but conscious that glabrous-sheathed plants are more general in the North than are those with villous sheaths, I elevated the form to varietal rank as *B. ciliatus*, var. *denudatus* (Wiegand) Fernald, Rhodora, xxviii. 20 (1926). Since the conceptions back of *B. ciliatus*, forma *denudatus* and var. *denudatus* were mixed, since their technical type is a specimen with badly shattered panicle and since forms with villous or with glabrous (denudate) sheaths occur in our other species of the group (*B. ciliatus*, *B. Richardsoni*, *B. altissimus*, *B. purgans*, etc.) it would be unwise further to elevate the name. The International Rules of Nomenclature make no requirement that a name appropriate in one category shall necessarily be retained when the rank is changed, particularly if it is a *nomen confusum*. It seems right, therefore, to give this belated recognition to the acumen of the late William Russell Dudley, who nearly half a century ago clearly recognized the distinctness of the plant here proposed as *B. Dudleyi*, and to designate as a type a numbered specimen of unquestioned identity.

The specific distinctions between *Bromus Dudleyi* and *B. ciliatus* are briefly stated below:

B. ciliatus. Panicles (except in dwarf plants) 1–3 dm. long, with more or less nodding branches: spikelets green or greenish, rarely purple- or bronze-tinged, at maturity loose, displaying the rachilla: glumes strongly conduplicate; the 2d narrowly lance-attenuate, 3-nerved, the greenish nerves very slender: lemmas subcoriaceous, conduplicate or involute, lance-attenuate, with very delicate nerves; the marginal band appressed-pilose to sericeous or glabrous: palea linear, usually closely embraced by

[1] Wiegand & Eames, Fl. Cayuga L. Basin, 61 (1926).

the strongly folded lemma; the green and ciliate ribs marginal their entire length, the hyaline border abruptly folded toward the middle of the palea: caryopsis linear-lanceolate.

B. DUDLEYI. Panicles 0.6–2 dm. long, their branches scarcely nodding: spikelets mostly purple- or bronze-tinged, rarely green, with crowded lemmas; the rachilla usually hidden: glumes flattish or merely dorsally rounded; the 2d with coarse colored nerves: lemmas flattish, submembranaceous, oblong, obtuse to subacute, strongly nerved; the marginal band conspicuously villous-hirsute especially below the middle: palea oblong, flat, scarcely embraced by the lemma; the ciliolate nerves midway between the entire margin and the middle except at the tip where they become marginal: caryopsis oblong-lanceolate.

These contrasts are brought out in the plate, for which I am indebted to Dr. H. M. Raup and Mr. A. N. Steward, showing spikelets of *B. ciliatus* (FIG. 4) and its variety (to be discussed in succeeding paragraphs) (FIG. 5) and a panicle (FIG. 1), spikelet (FIG. 2) and palea (FIG. 3) of *B. Dudleyi* from the type-collection of that species. For comparison, spikelets of *B. Kalmii* (FIG. 7), *B. Porteri* (FIG. 6) and *B. ramosus* (FIG. 8) are also shown.

Bromus Dudleyi (FIGS. 1–3), as Dudley (quoting Vasey) stated, is nearer related to some Rocky Mountain plants than to true *B. ciliatus* (FIGS. 4 and 5). It occurs itself in British Columbia and Montana and doubtless elsewhere in the Rocky Mountains, where its nearest relative is *B. Porteri* (Coult.) Nash (FIG. 6), but that species has the panicle much looser and the lemmas densely pubescent over their entire surfaces, much as in *B. Kalmii* Gray (FIG. 7) of usually dry soils of the eastern United States. The western specimens of *B. Dudleyi* have been called *B. Richardsoni* Link, but that species closely simulates *B. ciliatus* in its strongly folded or conduplicate and silky-margined lemmas. In habit, early flowering, short cauline leaves, flattish lemmas and flat-margined paleas *B. Dudleyi* is equally close to *B. Kalmii* (FIG. 7), but the latter species of mostly dry habitats from southwestern Maine southward and westward is at once distinguished by the extreme pubescence of its spikelets, shorter and broader lemmas, with shorter awns and more numerous and more prolonged nerves, and narrower paleas with pilose or almost villous nerves.

The original locality of *Bromus canadensis* Michx. Fl. Bor.-Am. i. 65 (1803), recorded on the label as Lake St. John, and Michaux's characters, "foliis rariter pilosis: . . . florum valva exteriore . . . versus margines villosa," suggest that *B. Dudleyi* might be *B. canadensis*. Michaux, however, apparently collected the latter late in the season, long after *B. Dudleyi* is mature ("Le 12 Septembre

. . . arrivé . . . au Poste du lac St Jean . . . Le 13 j'ay herborisé aux environs du Lac."—Journ. André Michaux, ed. Sargent, 85, 86). The other characters given by Michaux might belong to either *B. ciliatus* or *B. Dudleyi* but, fortunately, in the series of fragments of types accumulated by Professor Hitchcock at Washington there is a spikelet of the type of *B. canadensis*. This spikelet, most kindly loaned me for study by Dr. Jason R. Swallen, is not only young but thoroughly characteristic of the late-flowering plant generally accepted as *B. ciliatus*.

Bromus ciliatus L. When I took up[1] *Bromus ciliatus*, forma *denudatus* Wiegand[2] as var. *denudatus*, I pointed out that the plant with glabrous or nearly glabrous median and upper sheaths is far more abundant northward and far less abundant southward than the plant with densely retrorse-villous sheaths. After the removal from the former series of *B. Dudleyi* it becomes important again to note the relative abundance of the two extremes left in *B. ciliatus*. The material before me (in the Gray Herbarium and the herbarium of the New England Botanical Club) shows the following contrasts in relative abundance.

	Labrador Peninsula (Straits of Belle Isle and Cote Nord to James Bay)	Anticosti I. and Gaspé Peninsula	Newfoundland	New Brunswick	Nova Scotia	Southwestern Quebec (Temiscouata Co. to Eastern Townships)	Maine	New Hampshire	Vermont	Massachusetts	Connecticut	New York
Middle and upper sheaths glabrous or only remotely and sparsely pilose	6	30	31	6	8	3	33	14	8	8	0	0
Sheaths densely pilose or villous	0	0	3	3	3	5	45	27	14	16	8	6

Besides being generally more northern, the plant with glabrous or nearly glabrous sheaths shows a strong subalpine tendancy, occurring on the high escarpments of western Newfoundland, on the subalpine meadows (alt. 900–1125 m.) of the Shickshock Mts. of Gaspé, on the Fan of Huntington's Ravine (alt. 1372 m.) on Mt. Washington, New Hampshire, and on the famous cold and subalpine slides of Willoughby, Vermont; it also occurs at the summit of Roan Mt. (alt. 1917 m.),

[1] Fernald, Rhodora, xxviii. 20 (1926).
[2] Wiegand, Rhodora, xxiv. 91 (1922).

North Carolina. Contrasted with this strong subalpine tendency of the smoother plant is the fact that, of the plant with densely villous or pilose upper sheaths not a single specimen from Newfoundland to Ontario and Connecticut has been collected at any appreciable altitude. Furthermore, while the marginal pubescence of the lemmas in the plant with villous upper sheaths is delicate and appressed-sericeous, the pubescence of the lemma in the more boreal glabrous-sheathed extreme is more variable, sometimes appressed-sericeous but more often coarsely pilose. The characteristically pilose-margined lemma and the smooth sheaths are well brought out in the illustration of *B. ciliatus* in Shear, Revis. N. A. Sp. Bromus, fig. 16.[1] Shear did not attempt to differentiate the two extremes of *B. ciliatus*, but Wiegand, in breaking up the species defined his conception of typical *B. ciliatus* as having "Sheaths villous; blades usually hairy," while his forma *denudatus* has "Sheaths glabrous or the lowermost slightly villous; blades usually glabrous."[2] Wiegand's interpretation was accepted unquestioned when I elevated his forma *denudatus* to var. *denudatus*.[3] But, as already pointed out, the designated type of forma or var. *denudatus* is not conspecific with the bulk of the material with glabrous upper sheaths; consequently it is necessary to look anew into the proper names for the varieties of *B. ciliatus*.

The original description of *Bromus ciliatus* L. was as follows:

> *ciliatus*. 4. BROMUS panicula nutante, foliis utrinque vaginisque subpilosis, glumis ciliatis.
> *Habitat in* Canada; *ex semine. D. Kalm.*
> *Culmi tenues. Folia utrinque & vaginae vix manifeste pubescentes. Panicula valde nutans, non crispis pedunculis. Spiculae oblongae, compressae, petalorum marginibus (non dorso) valde pilosis, qua nota facile distingvitur. Flosculi 8, sub apice aristati; calyces nudi. Glumae corollae lanceolatae.*[4]

According to Hitchcock[5] there is nothing in the Linnean herbarium which has the glumes glabrous on the back ("petalorum marginibus (non dorso) valde pilosis") and which can, therefore, be considered a "type." He consequently concluded that we should retain the name *B. ciliatus* for the plant as treated in Shear's monograph. This seems the proper course; and since Shear, in monographing the genus, specially illustrated the plant with glabrous sheaths and pilose-

[1] U. S. Dept. Agric. Div. Agrost. Bull. No. 23: 32, fig. 16 (1900).
[2] Wiegand, Rhodora, xxiv. 90 (1922).
[3] Fernald, Rhodora, xxviii. 20 (1926).
[4] L. Sp. Pl. i. 76, 77 (1753).
[5] Hitchcock, Contrib. U. S. Nat. Herb. xii. 122 (1908).

margined lemmas, this extreme should be taken to stand as true *B. ciliatus*. Fortunately, this is the commoner variety in Canada, whence Kalm secured the seed; and the emphatic statements of Linnaeus that the "sheaths are scarcely manifestly pubescent (vaginae vix manifeste pubescentes)" and that "the margins of the lemmas are conspicuously pilose (petalorum marginibus (non dorso) valde pilosis, qua nota facile distingvitur)" make it reasonably clear that Shear's illustration truly embodies[1] the important characters of the Linnean plant. This interpretation, that Linnaeus had the common plant of northeastern Canada with scarcely pubescent sheaths gains support from the fact that, in the *Species Plantarum*, *B. ciliatus* with "vaginae vix manifeste pubescentes" came immediately after Linnaeus's other American species, *B. purgans*, in which the sheaths are rarely so pubescent as in the villous-sheathed extreme of *B. ciliatus*. Yet Linnaeus described *B. purgans* as having "*Vaginae foliorum retrorsum pilosae.*" *B. canadensis* Michx. seems to have been based on small specimens of true *B. ciliatus*.

For the less boreal plant with villous sheaths I find no published name. I am therefore designating the two varieties as follows:

Bromus ciliatus L., var. **genuinus.** *B. ciliatus* L. Sp. Pl. i. 76 (1753). *B. canadensis* Michx. Fl. Bor.-Am. i. 65 (1803). *B. ciliatus* Shear, U. S. Dept. Agr. Div. Agrost. Bull. No. 23, fig. 16 (1900). *B. ciliatus*, forma *denudatus* Wiegand, Rhodora, xxiv. 90 (1922), in large part but not as to type. *B. ciliatus*, var. *denudatus* (Wieg.) Fern. Rhodora, xxviii. 20 (1926), in large part but not as to type.—Middle and upper sheaths glabrous or nearly so: margin of lemma pilose to sericeous.—Newfoundland and southern Labrador Peninsula to Manitoba, south to Nova Scotia, Massachusetts, northern Ohio, Michigan, Wisconsin and North Dakota, often ascending to subalpine areas; Roan Mt., North Carolina.

Var. **intonsus,** n. var., vaginis mediis superioribusque villosissimis vel valde retrorse-pilosis; lemmatis marginibus sericeis.—Newfoundland and southern Quebec to southern Ontario, south at low altitudes to Pennsylvania and Michigan. Type: Ashfield, Massachusetts, August 4, 1909, *E. F. Williams* (in Gray Herb.).

All the older sheets of *B. ciliatus* var. *intonsus* in the Gray Herbarium were labeled in the hand of William Boott or of Asa Gray *B. asper;* and this variety formed the basis of the entry in Gray's Manual, ed. 5, of *B. asper* from "Bethel, Maine, in fields along the river-bank, *W. Boott.* (Nat. from Eu.)"[2] and the more ample range in

[1] Except for the superabundance of lemmas.

[2] Gray, Man. ed. 5: 635 (1867).

ed. 6: "N. Brunswick to Mich. and Ky. (Nat. from Eu.)."[1] The record was taken over by Britton & Brown and in their Illustrated Flora, ed. 2, is entered as "In waste places, New Brunswick to Michigan and Kentucky. Naturalized from Europe."[2] That William Boott and Asa Gray were not quite convinced that the plant they called *B. asper* was really an introduction is shown by the penciled memoranda in Gray's hand, obviously inspired by the field knowledge of Boott, on some of the labels: "native"; nevertheless this pertinent and most important item did not find an entry into the Manual. In his monographic study of the genus in North America, Shear, taking up for *B. asper* Murr. (1770) the earlier name *B. ramosus* Huds. (1762), said: "A species introduced from Europe. It is said in Britton and Brown's 'Illustrated Flora' to be distributed from New Brunswick to Michigan and Kentucky. We have no American specimens in the National Herbarium."[3] Had he realized the sources of Gray's and Britton & Brown's records, Shear could have added that there were no American specimens of *B. ramosus* (*B. asper*) extant and that the original identification was an error; for *B. ramosus* of Europe (FIG. 8) differs from the American plant mistaken for it in its pubescent culms, narrower and much prolonged panicle, more remote and longer lemmas with longer awns, and anthers very much longer (4 mm. long).

EXPLANATION OF PLATE 196

(Figures × 1¾)

FIG. 1, panicle of BROMUS DUDLEYI (from type-number); FIG. 2, spikelet of B. DUDLEYI; FIG. 3, inner face of lemma, showing flat palea; FIG. 4, spikelet of B. CILIATUS, var. GENUINUS from Table–top Mountain, Quebec (*Fernald & Collins*, no. 169); FIG. 5, spikelet of B. CILIATUS, var. INTONSUS from the type; FIG. 6, B. PORTERI from type-locality, Twin Lakes, Colorado (*Wolfe*, no. 807); FIG. 7, B. KALMII from the assumed type, Troy, New York, *Asa Gray;* FIG. 8, B. RAMOSUS (*B. asper*) from Bavaria (*Fl. Exsicc. Bav.* no. 597).

V. SOME VARIETIES OF THE AMPHIGEAN SPECIES OF OSMUNDA

M. L. FERNALD

THREE species of Osmunda are found on both of the northern continental masses, Eurasia and North America. One of them extends into tropical South America, another into subtropical and tropical

[1] Wats. & Coult. in Gray, Man. ed. 6: 670 (1890).
[2] Britton & Brown, Ill. Fl. ed. 2, i. 275 (1913).
[3] Shear, U. S. Dept. Agric. Div. Agrost Bull no. 23: 30 (1900).

Africa, and five additional species are Asiatic endemics and a sixth South American. In a recent attempt to determine the degree of identity or of segregation of the three amphigean species in the Northern Hemisphere certain parallel variations in the three which apparently have not been generally recognized by students of the ferns have come to my attention.

Osmunda regalis and its var. spectabilis. For more than a century systematists have wavered in their estimate of the American *Osmunda regalis* L., sometimes treating it as a species, *O. spectabilis* Willd. Sp. Pl. v. 98 (1810), sometimes as an American variety, *O. regalis*, var. *spectabilis* (Willd.) Gray, Man. ed. 2: 600 (1856), and often as not separable from the European type. In European descriptions *O. regalis* is very generally stated to be 4 to 6 feet (1.2–1.8 m.) high and most accounts tell of exceptional colonies reaching a height of 12 feet (3.6 m.), but in dry or sterile habitats and toward the northern limit of its range the European plant may be only 2–4 feet (0.6–1.2 m.) high, and in the dwarf var. *pumila* Milde it is extraordinarily low, only 9 inches (2.2 dm.) high. The plant of eastern North America (Newfoundland to the Saskatchewan, south to Florida and Texas) certainly reaches no such height as 3.6 m. (12 feet); in fact, the measurements with us were accurately stated by the late D. C. Eaton when he wrote: "The fronds of the royal fern are said to attain the height of ten or eleven feet in the British Islands; but the highest I have ever seen were from the valley of the Connecticut River, and measured six feet from the ground. Fronds four or five feet high are not at all rare; but more commonly the fronds, including the stalk . . . stand from two to four feet high. In dryish marshes they are often not more than a foot or fifteen inches high."[1] Had Eaton seen the American plant at the northeastern limit of its range, in eastern Quebec and Newfoundland, he would have brought his minimum measurements down even lower than those of the European var. *pumila*, for on the barren slopes of western Newfoundland, in eastern Quebec and at the altitudinal limit of the fern on Mt. Katahdin, Maine, it is often less than 8 inches (2 dm.) high. Surely, if there were any truth in the oft-repeated tale of Osmund, the ferryman, hiding his wife and daughter in the shade of the Royal Fern, it is clear that the dramatic incident would find greater probability when linked to the tall extreme of the European plant than it would if visualized as occurring in the tell-tale shade of our low American representative of it!

[1] Eaton, Ferns N. Am. i. 213 (1879).

Numerous characters, narrower and more remote pinnules without basal auricle, finer serrulation, the presence of a bloom, and more slender fruiting panicles, have been emphasized as distinguishing *O. spectabilis* from *O. regalis;* but, although extreme specimens are easily separated, these points are by no means constant and apparently identical pinnules with or without auricles can be found on either continent, while bright-green and glaucous plants are both common with us. The generally lower stature and generally more slender or more delicately branched panicle of the American plants seem to be real tendencies; and in studying the plants of the two continents I find another character which has either been overlooked or not much stressed. On the rachises of the fruiting panicles of true *Osmunda regalis* I find numerous rather persistent black scale-like trichomes; on the rachises of the panicles of *O. spectabilis* I find none of them or, at most, a few elongate axillary hairs. This difference is so real in all material fit for comparison that, combined with the other strong, though far from constant tendencies of the plants it may be taken as the diagnostic character of a reasonably good geographic variety. I am, therefore, maintaining our plant as O. REGALIS L., var. SPECTABILIS (Willd.) Gray.

O. CLAYTONIANA AND ITS VAR. VESTITA. It is generally stated that *Osmunda Claytoniana* L. has three disrupted areas of distribution: eastern North America (Newfoundland to Lake Mistassini and Lake Winnepeg, south to North Carolina, Kentucky and Missouri), eastern Asia (Japan and Corea to the Himalayas) and Brazil. The plant of North America has the very young fronds more or less wooly with whitish-brown tomentum. This is promptly deciduous and persists on the older fronds only as cobwebby remnants, but always of a pale-brown color. The plant of the Himalayan region, however, has more abundant and, apparently, more persistent wool of a strong ferruginous color.

The name of the Himalayan variety is OSMUNDA CLAYTONIANA, var. VESTITA (Wall.) Milde, Monogr. Gen. Osmundae, 102 (1868). Wallich, Cat. no. 52 (1829) had the *nomen nudum: "Osmunda monticola,* Wall. Kumoon, R. B.," followed by "*β. vestita, frondibus apice fertilibus.*" In 1833, Wallich's no. 52, recorded by him as *O. monticola,* collected in Kumoon by Robert Blinkworth ("R. B."), was formally described by Greville & Hooker as

3. O. pilosa *Wall.*
   Frondibus ovato-lanceolatis pinnatis (junioribus densissime ferrugineo-lanatis) . . . —*Wall. Cat. No.* 52.

Hab. Rio Janeiro, *Dr. Wallich.*—This is very closely allied to *O. interrupta* of North America, which differs, however, ... in its glabrous fronds; but, if we are not mistaken, the latter is covered in a young and recent state with a ferruginous down, in which case we scarcely know how the present plant is to be distinguished, except by its larger size, and denser pinnae, ..."[1]

Osmunda monticola Wall. was unquestionably a *nomen nudum* but his var. *vestita* of it had a phrase of description. Greville & Hooker definitely described no. 52, not as *O. monticola*, but as *O. pilosa* (ascribed to Wallich), "Frondibus . . . junioribus densissime ferrugineo-lanatis." This characterization is correct for all Himalayan material I have seen; and since Milde, although not distinguishing the Himalayan plant in general from the American, took up *O. monticola*, *β. vestita* Wall. Cat. no. 52 as *O. Claytoniana*, var. *vestita* (Wall.) Milde, Monogr. Gen. Osmund. 102 (1868), we may use that varietal name for all the Himalayan plants. Var. *vestita* was intended technically as the name for an unusual form hardly worthy varietal recognition, but, here extended, it covers the Himalayan plant with rufescent wool, as contrasted with true *O. Claytoniana*, in which the wool is whitish-brown. Whether the plant of easternmost Asia is all the same as the Himalayan I cannot say, as the Asiatic material in the Gray Herbarium is all from the Himalayan area; but the Asiatic plant is presumably all of a single variety. The material from the high mountains of Yunnan, at least, seems to be var. *vestita*, for Dr. Christensen, taking it to be a new variety, has published it as var. *lanosa* Ch. Christens. in Levéillé, Cat. Pl. Yun-nan, 107 (1916), with the description identical in substance ("Rachis ut in O. cinnamomea L. tomento rufo densissime tecta") with that of the earlier *O. pilosa* Wall. which was based on Wallich's no. 52, which was also the type of *O. Claytoniana*, var. *vestita* (Wall.) Milde.

The habitat "Rio Janeiro," given by Greville & Hooker for Wallich's plant has been thoroughly misleading. In his *Monographia Generis Osmundae* (1868), Milde gave the range of *O. Claytoniana* as **"Nord America:** . . . **Süd Amerika:** Rio Janeiro. (Wallich). **Asia"**; and in his *Ferns of North America* (1879), Eaton said "has been attributed to Brazil, near Rio Janeiro, though probably by an error of Wallich's."[2] The error was not Wallich's, however, but Greville & Hooker's. Wallich clearly gave his no. 52 as coming from Kumoon; but the next following, no. 53, *Aneimia flexuosa*, was listed as coming from "Rheo Janeiro 1807." It is obvious that, in copying, Greville

[1] Grev. & Hook. in Hook. Bot. Misc. iii. 229 (1833).
[2] Eaton, Ferns N. A. i. 220 (1879).

& Hooker passed over the correct locality and collector of no. 52, the basis of *O. pilosa* and of *O. Claytoniana*, var. *vestita*. It is also evident that the Brazilian record of *O. Claytoniana* may safely be dropped.

O. CINNAMOMEA AND ITS GEOGRAPHIC VARIETIES. *Osmunda cinnamomea* L., like *O. Claytoniana*, occurs in eastern America (Newfoundland to Georgian Bay, Ontario and Wisconsin, south to northern Florida, Alabama and Texas; with var. *imbricata* from the Bermuda Islands and Florida to Louisiana, south to tropical Mexico and Brazil) and *O. cinnamomea* is usually said to occur in eastern Asia (Amur, Manchuria and Sachalin Island to Yunnan). But just as the Eurasian *O. regalis* differs from the eastern American *O. regalis*, var. *spectabilis* in having black scale-like trichomes on the rachises of the fruiting panicle and the Himalayan *O. Claytoniana*, var. *vestita* differs from the eastern American plant in having much darker and more persistent wool, so the eastern Asiatic *O. cinnamomea* is at once distinguished from typical *O. cinnamomea* of temperate eastern America by having the tomentum of the stipes, rachises and fertile fronds rufescent, that of the fertile fronds with many black trichomes intermixed, the tomentum of typical *O. cinnamomea* being whitish-brown without any black admixture.

The plant of tropical and subtropical eastern America, O. CINNAMOMEA, var. IMBRICATA (Kunze) Milde, Mongr. Gen. Osmund. 95 (1868), has the tomentum more rufescent than in typical *O. cinnamomea* but it, likewise, lacks the black admixed trichomes of the Asiatic plant.

The three geographic varieties may be distinguished as follows:

O. CINNAMOMEA L., var. **typica.** *O. cinnamomea* L. Sp. Pl. ii. 1066 (1753). *Struthiopteris cinnamomea* (L.) Bernh. Schrad. Journ. 1800²: 126 (1801). *Osmundastrum cinnamomeum* (L.) Presl., Abh. Böhm. Ges. Wiss. ser. 5, v. 326 (1848).—Tomentum of stripes, rachises and fertile fronds whitish-brown: mature sterile pinnae 1.5–3.5 cm. broad, membranaceous, translucent; the veinlets scarcely elevated beneath.—Temperate eastern North America.

Var. IMBRICATA (Kunze) Milde, Mongr. Gen. Osmund. 95 (1868). *O. bipinnata* L. Sp. Pl. ii. 1065 (1753).[1] *O. imbricata* Kunze, Farnkr. ii. 29, t. cxii. (1849).—Tomentum brown to rufescent: mature sterile pinnae 1–2.3 cm. broad, subcoriaceous, opaque; the veinlets somewhat prominent beneath.—Tropical and subtropical eastern America.

Var. **asiatica**, var. nov., lamina fertili plus minusve nigricanti-villosa; stipitum rhachiumque vestimento rufescenti.—Amur, Man-

[1] *O. bipinnata* was published by Linnaeus on the page preceding the publication of *O. cinnamomea*. By those who accept the principle of "priority of position" *O. bipinnata* should be used instead of the more familiar *O. cinnamomea*.

churia and Sachalin Island to Yunnan; the following are characteristic. Amur: without designation of locality, *Maximowicz;* Amur medius, 1891, *S. Korshinsky* (type in Gray Herb.). Manchuria: between Mukden and Tungche-shien, 1886, *H. E. M. Jones.* Sachalin: without designation of locality, *Augustinowicz.* Japan: Hokodati, 1853–56, *J. Small* (U. S. No. Pacif. Expl. Exped.); Yokohama, 1862, *Maximowicz.*

It is perhaps not without interest to note that the very marked tendency of the Eurasian varieties of *Osmunda regalis, Claytoniana* and *cinnamomea* to have deeper-colored trichomes or darker and firmer scales than the eastern American plants is quite parallel with the situation in some other varieties or closely allied species of ferns. It has long been recognized that the Eurasian *Thelypteris spinulosa* (Muell.) Nieuwl. var. *dilitata* (Hoffm.) St. John has firm blackish scales on the stipe and that these often extend well along the rachis or even to the rachillas, while the eastern American representative, *T. spinulosa,* var. *americana* (Fischer) Weath. has thin and translucent soft and pale-brown scales which are more promptly deciduous.[1] Again, in European *Polystichum Braunii* "The largest scales of the stipe-bases . . . are rather firm . . . ; in the eastern American [var. *Purshii* Fernald] they are much thinner."[2] Other cases (European *Polypodium vulgare* L. and eastern American *P. virginianum* L., European *Asplenium Ruta-muraria* L. and eastern American *A. cryptolepis* Fernald; etc.) could be cited, in which species of eastern America and their representatives in Europe have apparent differences in the texture and often the depth of coloring of their scales. These characters are small but the scales seem to have evolved along quite definite lines on the two continental masses; and doubtless study of other ferns will bring to light parallel situations in other groups.

VI. POTAMOGETON ALPINUS AND P. MICROSTACHYS

M. L. Fernald

(Plate 197)

In 1827 Wolfgang, receiving material from the Aleutian Islands of a plant related to the European *Potamogeton alpinus* Balbis (1804) or *P. rufescens* Schrader (1815), proposed it as a new American species:

[1] For detailed discussion see Fernald, Rhodora, xvii. 45–47 (1915).
[2] Fernald, Rhodora, xxx. 29 (1928).

Potamogeton *microstachys W o l f g.;* caule simplici, tenui; foliis lineari-lanceolatis, subsessilibus, obtusiusculis, utrinque attenuatis, 5-nervibus: nervo medio crassiusculo, reticulato-venosis; stipulis internodia subaequantibus; pedunculis tenuibus, foliis brevioribus; spicis terminalibus, paucifloris. *W o l f g. Ms. n.* 15, *B e s s e r in litt.*

Specimina nostra, a cel. *Eschscholtz* in *U n a l a s c h k a* lecta, nondum sat evoluta, dum unicâ solum spicâ sint instructa, et caulis 8-pollicaris et internodia brevia; videntur ex aqua stagnante. Folia 4–5-poll., 2–3 lin. lata. *W o l f g.*[1]

At approximately the same time Chamisso,[2] apparently unaware of the conclusion of Wolfgang and discussing the pondweeds collected on the Romanzoff expedition, correctly defined *P. alpinus* (as *P. rufescens*) and showed in his illustrations (t. V. fig. 18) the distinctive fruit of the European plant, "Nux . . . stylo subapicali acuminata." In discussing the variations of the species Chamisso mentioned narrow-leaved and broad-leaved forms and under the "Forma angustifolia" the Unalaska material which was doubtless the basis of Wolfgang's *P. microstachys:*

Specimina, quae ipsi in stagnis frigidis insulae Unalaschca Aleutorum carpsimus, jam spicigera, nondum efflorata, huc non referre nequimus. Folia ad summum 4 pollicum longitudinem attingunt, 2–3 lin. lata, obtusa, septemnervia, nervo medio utriusque lateris paginae validiore. Internodia fere pollicaria. Spica brevis, pauciflora (nondum florens). Caulis spithamaeus. Folia natantia in nonnullis individuis jam incipientia. Semina non vidimus.[3]

Twenty years later, Alphonso Wood, getting into northeastern Vermont where the American plant which had already been described by Wolfgang and by Chamisso abounds, took it to be a new species and gave the first accurate account of its fruit, "subhemispherical, margined on the back, beak incurved." Wood's species was

P. obrutus. Wood. *Lyndon Pond-weed.*

Lvs. glossy, linear-lanceolate, sessile, rather acute, only the midvein conspicuous, alternate, approximate, the lower stipules wanting; *spikes* long-pedunculate; *achenia* inflated, subhemispherical, margined on the back, beak incurved both sides, conspicuously umbilicate.—Passumpsic river, Lyndon, Vt.! A remarkable species, differing widely from any other with which I am acquainted. Stem round, slender, simple. Leaves uniform, 3–4′ by ½′, tapering to the slightly clasping base, the two upper opposite. Spike dense, 1½′ long, peduncle 3′ in length. Fruit with 2 little pits.[4]

But in spite of Wood's clear characterization of the fruit of the American plant, his species, *P. obrutus*, and Wolfgang's earlier *P.*

[1] Wolfg. in Schultes & Schultes, Mantissa, iii. 360 (1827).
[2] Cham. in Cham. & Schlecht. Linnaea, ii. 210-213, t. V, fig. 18 (1827).
[3] Cham. l. c. 211 (1827).
[4] Wood, Class-Bk. ed. 2: 525 (1847).

microstachys were quickly reduced and, so far as I can find, have never received the recognition they clearly merit. In 1856 Gray reduced to *P. lucens* L. an amazing number of species not then at all understood by him, *P. fluitans* Roth, *P. pulcher* Tuckerm., *P. amplifolius* Tuckerm. and *P. rufescens* Schrad., "a narrow-leaved form, with smaller fruit, &c., either without floating leaves (P. obrutus, *Wood*) or with them";[1] and this most unsatisfactory grouping was maintained by Gray until 1867. In that year Robbins's very clear and satisfactory differentiation of these species appeared,[2] but he still maintained *P. obrutus* as inseparable from *P. rufescens*. In 1893 Morong took up[3] in place of *P. rufescens* Schrad. the earlier name *P. alpinus* Balbis, but nowhere in his monograph did he mention either of the names, *P. microstachys* and *P. obrutus*, which had been given to supposedly distinct American species. Morong's plate, however, showed the characteristic fruit of the American plant, the "subhemispherical" fruit of Wood, with strongly rounded back and with very short beak at the summit of the ventral face; rather than the "Nux . . . stylo subapicali acuminata" of the European plant as correctly described and illustrated by Chamisso and as shown in such early European illustrations as Hornemann, Fl. Danica, ix. fasc. xxv. t. mccccl (1813) and x. fasc. xxviii. t. mdcxxxv (1819), Reichenbach, Ic. Crit. ii. t. clxxxiv (1824) and Fieber, Die Potamogeta Böhmens, t. i. fig. 4 (1838). Susbequent American authors have consistently followed Morong.

As already noted, Wolfgang and Chamisso, having young material "(nondum florens)," emphasized the narrower and few-nerved submersed leaves of the American plant; and in recent years some European students of *Potamogeton* have similarly commented upon a slight habital difference between the American and eastern Asiatic plant on the one hand, and true *P. alpinus* of Europe on the other but, so far as I can find, they have made no comparison of the mature fruits. Thus, in 1904, the late Arthur Bennett[4] published the following note:

> P. ALPINUS Balb. (*P. rufescens* Schrad.). On the receipt of a sheet of specimens of this species from the herbarium of Prof. Kinashi, of Japan, I was impressed by the dark colour (almost black), the narrow leaves, and the absence of floating leaves. On looking up my Asiatic and American specimens, I found that all the former were of the same tint, and lacked floating leaves; out of eleven American examples only one had any sign of them, and in the British Museum Herbarium they are present in only one example.

[1] Gray, Man. ed. 2: 435 (1856).
[2] Robbins in Gray, Man. ed. 5: 486, 487 (1867).
[3] Morong, Naiadaceae of N. Am.—Mem. Torr. Bot. Cl. iii. No. 2: 19, t. xxx (1893).
[4] Bennett, Journ. Bot. xlii. 72 (1904).

Dr. Robbins, in Gray's *Manual*, ed. 5, 486 (1879), says, "floating leaves often wanting (*P. obrutus* Woods)." These dark-coloured narrow-leaved forms are the *P. rufescens* "forma angustifolia" of Chamisso (*Linnaea*, ii. 211 (1827) = *P. microstachys* Wolfgang in Roem. & Schultes, *Mantissa*, iii. 360 (1827).

These specimens look very different from the forms named *P. nerviger* Wolfg. (*l. c.* 359) and those named var. *maximus* Mert. & Koch, Deutschl. Fl. i. 841 (1823), and were it not for the numerous connecting links might well be considered a distinct species.

Subsequently in *Das Pflanzenreich* Graebner, after giving the range of *P. alpinus*, added the "Nota 1. Specimina americana a me visa omnia angustifolia sunt";[1] and, taking his cue from Bennett's note already quoted, Graebner set up *P. alpinus*, proles *microstachys* (Wolfg.) Graebn., based on *P. microstachys* Wolfg., with *P. rufescens* "forma angustifolia" Cham. and *P. obrutus* Wood as synonyms. Proles *microstachys* was defined: "Folia submersa angustiora, fluitantia saepissime absunt. Planta exsiccata nigrescens" and its only geographic range was "Ostasien verbreitet," Graebner obviously overlooking the fact that the type of *P. microstachys* was from Alaska and of *P. obrutus* from Vermont.

In general, the American plants which pass as *Potamogeton alpinus* do have narrower or smaller leaves than the European plants. The commonest extreme of the American plant (*P. microstachys* or *P. obrutus*) has the submersed leaves linear-lanceolate and acute or subacute, only rarely obtuse, much resembling those of the larger extreme of *P. epihydrus* Raf. They range from 0.7–2.5 dm. in length and 5–15 mm. in breadth and have usually 7 primary nerves (sometimes only 5, rarely 9 or 11). The other extreme of the American series is less common, a plant with narrowly elliptic-oblong round-tipped or very obtuse submersed leaves 4–8 (rarely –12) cm. long, 0.8–2 cm. broad and 7–13-nerved. When fresh the plants of both varieties are reddish or a warm reddish-green and even in the dried condition they retain the red in the younger parts, but I can see no more black in them than in the European material before me. The leaves of the American series are certainly narrower or smaller than in the European. Our narrowest-leaved plant (*P. microstachys* or *P. obrutus*) is comparable with the narrowest-leaved plant of Europe (*P. alpinus*, var. *angustifolius* (Tausch.) Aschers. & Graebn.) but the foliage of the broader-leaved plant of Europe is much larger than in ours, "usque ad 2 dm fere longa et 2,5 cm lata" (*Graebner*) and mostly 15–17-nerved, and in forma *ovatifolius* Hagström even 3.5 cm. broad.

[1] Graebner in Engler, Pflanzenr. iv.[11]. 72 (1907).

During anthesis our plant has a decidedly moniliform spike with the flowers quite remote (Pl. 197, spike at right), but at the same stage of development the European series shows more continuous spikes (spike at left), the flowers more approximate than in ours. In young fruit the two are difficult to separate, but when the fruits are quite mature they show the marked contrast which was brought out in the descriptions earlier quoted from Chamisso's account of European *P. alpinus* and Wood's characterization of the American *P. obrutus:* the mature fruits of the European plants are narrowed and subequally attenuate to the prolonged submedian beak; those of the American and eastern Asiatic series broader, strongly rounded at the summit of the broad dorsal keel and laterally beaked at the summit of the ventral margin merely by a very short but often incurving style. The photograph (Plate 197), generously supplied by Dr. Hugh M. Raup and Mr. Albert N. Steward, shows a series of mature fruits (enlarged to 2 diameters), those of the European plant (with a flowering spike below) at the left (figs. 1–16), those of the American and eastern Asiatic (with a characteristic flowering spike below) at the right (figs. 17–37). These fruits, taken from every mature European specimen in the Gray Herbarium and from a fully representative series of the American plant, hold consistently to the differences already enphasized. Associated with marked geographic segregation, differences in the foliage and in the degree of crowding in the flowering spike, the essentially dissimilar fruits indicate that, when Wolfgang described the quite immature *P. microstachys* in 1827 and when Wood twenty years later accurately described the fruit of his *P. obrutus,* they were distinguishing from European *P. alpinus* a well defined American and eastern Asiatic species.

For a plant with mature spikes 1.5–3.5 cm. long and 7–10 mm. thick the name *Potamogeton microstachys* would be inexplicable except for the clear statements, already quoted, that the Unalaska type was not yet in flower "(nondum florens)." The implication of Wood's name *P. obrutus* and assertions by him and by European students that the American plant lacks or but rarely develops floating-leaves is almost as unfortunate: of the 195 flowering or fruiting specimens in the Gray Herbarium and the herbarium of the New England Botanical Club 86 lack floating leaves, 109 (a clear majority) have them.

As already stated, *Potamogeton microstachys* has two rather strongly defined variations. These are

Potamogeton microstachys Wolfg., var. **typicus.** *P. micro-*

stachys Wolfg. in Schultes & Schultes, Mantissa, iii. 360 (1827). *P. rufescens*, "Forma angustifolia" from Unalaska, Cham. in Cham. & Schl. Linnaea, ii. 211 (1827). *P. obrutus* Wood, Class-Bk. ed. 2: 525 (1847). *P. rufescens* Am. auth. in large part, not Schrad. *P. alpinus* Am. auth. in large part, not Balbis. *P. alpinis*, Proles *microstachys* (Wolfg.) Graebn. in Engler, Pflanzenr. iv[11]. 72 (1907).—Submersed leaves linear-lanceolate or narrowly lanceolate, acute or subacute to obtuse, 0.7–2.5 dm. long, 0.5–1.5 cm. broad, usually 7 (5–11)-nerved.—Southern Greenland and Labrador to Alaska, south to Newfoundland, Nova Scotia, Maine, western Massachusetts, New York, Michigan, Colorado, Utah and California. The following are characteristic specimens. GREENLAND: Qagssiarssuk, Igaliko-Fjord, 60° 53′ N., August, 1925, *Porsild & Porsild*. LABRADOR: Rama, *Stecker*, no. 332. NEWFOUNDLAND: Little Quirpon, *Wiegand & Hotchkiss*, no. 27,337; pools at 400–550 m., Lookout Mountain, *Fernald, Long & Fogg*, no. 1207; Grand Falls, *Fernald, Wiegand & Darlington*, no. 4474; Carbonear, *Fernald & Wiegand*, no. 4473; George's Pond, *Fernald & Wiegand*, no. 2443. QUEBEC: Natashquan, *St. John*, nos. 90,083, 90,084; Cap à l'Aigle, *J. Macoun*, no. 68,919; Black Lake, *Fernald & Jackson*, no. 11,987; Lac William, *Victorin*, no. 11,162; Sargent's Bay, Lake Memphremagog, August 3, 1903, *Churchill*. NEW BRUNSWICK: Connors, *Pease*, no. 2907. NOVA SCOTIA: Truro, *Bean & White*, no. 22,963. MAINE: St. Francis River, August 13, 1902, *Eggleston & Fernald;* Madawaska, *Fernald*, no. 117; Ashland, 1881, *Kate Furbish;* Monticello, *Fernald & Long*, no. 12,386; Veazie, September, 1897, *Fernald;* Milo, September 2, 1897, *Fernald;* Dover, August 27, 1894, *Fernald;* Sydney, *Fernald & Long*, no. 12,388; Rangeley, 1894, *Furbish;* Pembroke, *Fernald*, no. 1622. NEW HAMPSHIRE: Northumberland, *Robbins*, also *Pease*, no. 17,270; Pondicherry Pond, Jefferson, 1829, *Robbins;* Hanover, July 12, 1910, *Williams*. VERMONT: "e flumine Passumpsic," *A. Wood* (original collection of *P. obrutus*); West Barnet, 1880, *F. Blanchard*. MASSACHUSETTS: Richmond, September 19, 1864, *J. W. Robbins*. NEW YORK: creeks at foot of Lake George, *Tuckerman;* Dexter, *Fernald, Wiegand & Eames*, no. 14,082. ONTARIO: Current River, *J. Macoun*, no. 94. MICHIGAN: Isle Royale, *W. S. Cooper*, no. 254 in part. MANITOBA: near Cumberland House, *Drummond*. MONTANA: Shoshone Lake, *Rydberg & Bessey*, no. 3724 (distributed as *P. Zizii*). COLORADO: Georgetown, *M. E. Jones*, no. 734; Seven Lakes, *Clements*, no. 491; Lake Eldora, Boulder Co., *Clokey*, no. 3118 (as *P. praelongus*). UTAH: Alta, *M. E. Jones*, no. 1297; Big Cottonwood Canyon, August, 1904, *Garrett*. CALIFORNIA: Silver Valley, *Brewer*, no. 1978. WASHINGTON: Mt. Adams, 1879, *Suksdorf;* Trout Creek, *Suksdorf*, no. 2172. BRITISH COLUMBIA: Revelstoke, *J. Macoun*, no. 4163. ALASKA: Kadiak Island, *Trelease*, no. 2870; Unalaska (the TYPE-LOCALITY), *Van Dyke*, no. 202. SIBERIA: Krestovskoi Islands (at mouth of Kolyma River), sent by *Regel*. AMUR: Amur Medius, 1891, *Korshinsky*. JAPAN: Sapporo, 1903, *Arimoto*.

Var. **subellipticus**, var. nov., foliis submersis anguste oblongo-ellipticis 4–8(–12) cm. longis 0.8–2 cm. latis 7–13-nerviis apice rotundatis vel obtusis.—Newfoundland to British Columbia, south to Maine, Vermont, Michigan and Wyoming. Newfoundland: shallow pools in limestone barrens, Flower Cove, July 28, 1924, *Fernald, Long & Dunbar*, no. 26,221; *Hotchkiss*, no. 27,338; shallow pools, Stephenville, August 15, 1910, *Fernald, Wiegand & Kittredge*, no. 2442; pond 4 miles northeast of Port à Port, *Mackenzie & Griscom*, no. 10,047. Quebec: pool in tundra, Ile Ouapitagone, July 14, 1915, *St. John*, no. 90,085; ruisseau sur les dunes, Rivière Goynish, *Victorin & Rolland*, no. 18,575; étangs des tourbières calcaires, Ile à la Proie, Mingan, 20 juillet 1925, *Victorin & Rolland*, no 20,462; étangs calcaires, Grande Ile, Mingan, 20 juillet 1925, *Victorin & Rolland*, no. 20,468; eaux tranquilles, Riv. au Saumon, Anticosti, 3 août 1925, *Victorin, Rolland & Louis*, no. 20,467; Riv. Sainte-Marie, Anticosti, 2 août 1926, *Victorin & Rolland*, no. 25,938; shallow pools, Seal Cove River, Douglastown, August 22, 1904, *Collins, Fernald & Pease;* "Petit Bassin," Riv. Ste. Anne des Monts, August 17, 1906, *Fernald & Collins;* small pond on river-flat, Riv. Cap Chat, August 27, 1923, *Fernald & Smith*, no. 25,420; shallow pool, Bonaventure River, August 8, 1904, *Collins, Fernald & Pease;* brook, Georgeville, July 27, 1902, *Pease*, no. 1919. Magdalen Islands: shallow pools, Coffin Island, August 27, 1912, *Fernald, Long & St. John*, no. 6766 (type in Gray Herb.); étangs, Ile du Hâvre-au-Ber, 17 juillet 1919, *Victorin & Rolland*, no. 9923. Nova Scotia: cold shallow brook, Baddeck Bay, August 27, 1920, *Fernald & Long*, no. 19,687. Maine: rills, Houlton, July 13, 1916, *Fernald & Long*, no. 12,387; shallow brook, Foxcroft, September 5 and 15, 1894, August 31, 1896, *Fernald*, Vermont: pond near Willoughby Lake House, August 4 and 11, 1881, *Faxon*, June 10, 1895 and September 15, 1899, *Kennedy;* Nigger Pond, alt. 1750 ft., Westmore, August 3–10, 1916, *Eames & Godfrey;* Little Leech Pond, Averill, August 7, 1899, *Eggleston*, no. 1656. New York: Minerva Brook, east of Minerva, August 6, 1927, *House*, no. 15,182. Michigan: Eagle Harbor, Keweenaw Peninsula, 1863, *Robbins;* shallow ponds, Keweenaw County, August, 1890, *Farwell*, no. 514. Wyoming: Branch of Sweetwater, Wind River Mts., East Fork of Big Sandy, and Heart Lake Creek, 1878, *C. Richardson*. British Columbia: Kicking Horse Lake, August 17, 1890, *J. Macoun*.

Explanation of Plate 197

(All figures × 2)

Spike at left and Figs. 1–16, Potamogeton alpinus: 1, from Ballynahinch, Ireland, *ex Nat. Mus. Irel.;* 2, Shropshire, England, *Leighton;* 3, Savoie, *Perrier;* 4, Längenfeld, Tirol, *Zimmeter*, no. 2683; 5, Coburg, Bavaria, *Schack;* 6, Eversen bei Westerwalsede, Germany, *Buchenau;* 7, Thüringen, *Rehder;* 8, Bavaria, *G. Fischer*, no. 481; 9, Bavaria, *Fischer*, no. 482; 10, Bavaria, *Fischer*, no. 342; 11, Coburg, Bavaria, *Schack;* 12, Germany, *Sennholz;* 13, Bräcke, Jemtland, Sweden, *Tiselius*, no. 15k; 14, Ostrogothia (Linköping),

Sweden, *Ekeroth;* 15, Christiania (Oslo), Norway, *Blytt;* 16, Torne Lappmark, *Laestadius.*

Spike at right and Figs. 17–37, P. MICROSTACHYS: 1, from Carbonear, Newfoundland, *Fernald & Wiegand,* no. 4473 (var. *typicus*); 18, Flower Cove, Newfoundland, *Hotchkiss,* no. 27,338 (var. *subellipticus*); 19, Grand Falls, Newfoundland, *Fernald & Wiegand,* no. 4474 (var. *typ.*); 20, Stephenville, Newfoundland, *Fernald & Wiegand,* no. 2442 (var. *subel.*); 21, Natashquan, Quebec, *St. John,* no. 90,083 (var. *typ.*); 22, Magdalen Islands, *Fernald, Long & St. John,* no. 6766 (var. *subel.*); 23, Truro, Nova Scotia, *Bean & White,* no. 22,963 (var. *typ.*); 24, Madawaska, Maine, *Fernald,* no. 117 (var. *typ.*); 25, Foxcroft, Maine, *Fernald* (var. *subel.*); 26, Sydney, Maine, *Fernald & Long,* no. 12,388 (var. *typ.*); 27, Pembroke, Maine, *Fernald,* no. 1622 (var. *typ.*); 28, Willoughby, Vermont, *Kennedy* (var. *subel.*); 29, Richmond, Massachusetts, *Robbins* (var. *typ.*); 30, Lake George, New York, *Tuckerman* (var. *typ.*); 31, Minerva, New York, *House,* no, 15,185 (var. *subel.*); 32, Bruce Peninsula, Ontario, *J. Macoun;* 33, Eagle Harbor, Michigan, *Robbins* (var. *subel.*); 34, Heart Lake Creek, Yellowstone Region, *C. Richardson* (var. *subel.*); 35, Georgetown, Colorado (var. *typ.*); 36, Falcon Valley, Washington, *Suksdorf* (var. *typ.*); 37, Krestovskoi Islands, Siberia, *ex Regel* (var. *typ.*).

VII. THE IDENTITIES OF JUNCUS CANADENSIS AND OF J. BREVICAUDATUS

M. L. FERNALD

(Plate 198)

IN 1827 Jacques Gay published *Juncus canadensis* characterized by

> Panicula composita, erecta, plus minusve coarctata vel laxiuscula . . . ; spicis 4–8–16-floris, plus minusve distantibus vel approximatis, echinatis, fuscescentibus. Perigonii foliola lanceolato-linearia, substriata, acutè aristata, interiora sublongiora. Stamina tria, perigonio breviora; . . . . Capsula ellipsoideo-prismatica, triquetra, utrinque leviter attenuata, vix mucronata; . . . Semina utrinque in caudam albidam abeuntia.[1]

Gay's description indicated at least two elements, one with coarctate, the other with lax inflorescence, one with "spikes" 4–8-flowered, the other with more flowers (–15); but both had the perianth-segments acutely aristate, stamens 3, and seeds with a white tail at each end. The two elements were distinguished as

J canadensis. *Gay! ined.*

α. Culmo foliisque tenuibus, paniculâ sublaxâ, spicis 10–15-floris remotiusculis.

β. Culmo foliisque tenuibus, paniculâ coarctatâ, spicis 4–8-floris approximatis.

In 1866, Engelmann took up[2] *Juncus canadensis,* with three varieties: "α. *brevicaudatus* (J. acuminatus, Gray)," "β. *subcaudatus,* Con-

[1] J. Gay in Laharpe, Mon. Jonc. 134 (1827).

[2] Engelm. Trans. St. Louis Acad. ii. 436 (1866).

necticut to Georgia," and "γ. *longicaudatus* (J. paradoxus, Gray), Massachusetts southward to Louisiana, and north-westward to Minnesota"; and under var. "α. *brevicaudatus*" he named two forms, "A. *coarctatus*, Pennsylvania, northward and northwestward" and "B. *patulus*, Pennsylvania to Western New York & Ohio." Engelmann in 1866 gave no descriptions and all his names of that date were *nomina nuda* except *J. canadensis*, α. *brevicaudatus*, which was a renaming of *J. acuminatus* of Gray's Manual of that period (ed. 4), not of Michx., and *J. canadensis* γ. *longicaudatus*, which was a renaming of *J. paradoxus* of Gray's Man. ed. 4, not E. Meyer.

Two years later (1868) Engelmann[1] dropped the properly published name *J. canadensis* α. *brevicaudatus* and the *nomen nudum J. canadensis* α. *brevicaudatus* B. *patulus* of 1866 and recognized four varieties: (1) Var. α. *coarctatus* for the plant formerly called *J. canadensis* α. *brevicaudatus* (including the form "A. *coarctatus*") with the explicit synonymy, "*J. Canadensis*, β. Gay, l. c.; *J. acuminatus*, Torr. N. Y. 2, 327; Gray, l. c. 481; Chap. Fl. 464, et. Auct. Am. plur. non Michx."; (2) Var. β. *brachycephalus*, substituted for the earlier *J. canadensis*, α. *brecivaudatus* B. *patulus* and now for the first time described; (3) Var. γ. *subcaudatus*, now for the first time properly published; and (4) Var. δ. *longecaudatus* (the second syllable altered from the original *gi*), described in detail, with not only the original synonym *J. paradoxus* Gray, not Meyer, but the more significant synonym *J. canadensis* α. Gay. It is perfectly clear, then, that Engelmann, who had studied Gay's specimens, in his final revision identified Gay's *J. canadensis* α. with the plant Gray and others had been calling *J. paradoxus* and which Engelmann now called *J. canadensis*, var. *longicaudatus;* it is also quite as clear that Engelmann's *J. canadensis*, α. *brevicaudatus*, A. *coarctatus* (1866), changed in 1868 to *J. canadensis* var. α. *coarctatus*, was based upon and drew its final name from Gay's "*J. canadensis*, β. . . . paniculâ coarctatâ."

So far as I can find, the first formal taking up of *Juncus canadensis* Gay as standing without qualification for *J. canadensis* α. of Gay or var. *longicaudatus* Engelm. was by Coville in Britton & Brown's Illustrated Flora, i. 394, fig. 955 (1896). Coville's correct interpretation was accepted by me at the time I split off Gay's *J. canadensis* β. or *Engelmann's* var. *brevicaudatus* as a species, *J. brevicaudatus* (Engelm.) Fernald, Rhodora vi. 35 (1904); and it was again accepted by Coville in the second edition of the Illustrated Flora (1913); and

[1] Engelm. l. c. 474 (1868).

still again, by Coville & Blake, in 1918 when they separated off the last remaining of Engelmann's varieties as *J. subcaudatus* (Engelm.) Coville & Blake, Proc. Biol. Soc. Wash. xxxi. 45 (1918). It would thus seem, since Gay's vars. α and β were so definitely identified by Engelmann, who had studied the specimens, and since Coville had definitely taken up as true *J. canadensis* the plant which Engelmann had found to be Gay's var. α, while I had taken up *J. brevicaudatus* for the plant which Engelmann found to be Gay's var. β, that the proper names for these plants had been satisfactorily settled.

But recently Mr. K. K. Mackenzie has expressed[1] his personal dissatisfaction with the identifications others have made of Gay's *Juncus canadensis* α and β. He has secured from Paris photographs of such material of Gay's as could be found. "It will be seen . . . that all of the Canadian and Newfoundland material cited by Gay represents his variety β. They all represent the plant now generally called *Juncus brevicaudatus* (Engelm.) Fernald, as marked by Engelmann.

"The only material cited by Gay unaccounted for above is the Torrey material . . . Investigation at Paris did not result in finding any such material . . ."

Since there is, apparently, no extant material to stand unquestioned for Gay's *J. canadensis* α, Mackenzie's solution is to transfer the name *J. canadensis* to *J. canadensis* β. and he forthwith coins for the plant which Engelmann, Coville and I have identified as *J. canadensis* α the new combination *J. longicaudatus* (Engelm.) Mackenzie. At the same time, although admitting that "the name *J. brevicaudatus* (Engelm.) Fernald . . . can logically be used as in our current manuals," Mackenzie believes it "would be the best course" to interpret *J. brevicaudatus* as based on material of *J. brachycephalus* (Engelm.) Buchenau.

In regard to the last suggestion it should be noted that *J. brevicaudatus* goes directly back to *J. canadensis*, "α. *brevicaudatus* (J. acuminatus, Gray)" of Engelmann (1866); in other words it was *J. acuminatus* of Gray's Manual, ed. 4 (1865). The salient points in Gray's description were "*Stem erect* (10′–15′ high) . . . *panicle with rather slightly spreading branches, bearing few or many* 3–8-*flowered chestnut-colored heads;* sepals lanceolate or linear-lanceolate, very acute, one third or one half the length of the prismatic triangular and abruptly acute pod; *seeds tail-pointed* at both ends. . . . Peat-bogs, and sandy borders of ponds." Mackenzie believes it "would be

[1]Mackenzie, Bull. Torr. Bot. Cl. lvi. 29–32 (1929).

the best course" to interpret *J. canadensis* α. *brevicaudatus* Engelm. (1866) as meaning his forma B. *patulus*, rather than his forma A. *coarctatus*. As already noted, Engelmann in 1868 took up var. *coarctatus* in place of his earlier *J. canadensis* α. *brevicaudatus* (and its forma A. *coarctatus*), while he substituted for α. *brevicaudatus* B. *patulus* of 1866 the new name var. *brachycephalus*, which is the basis of *J. brachycephalus* (Engelm.) Buchenau. Engelmann correctly described the latter as having "culms 1½–2½ feet high; panicles effuse, with spreading branches; sepals mostly obtuse; capsules obtusish and mucronate, short-exserted (caulibus elatioribus (1½–2½ pedalibus) . . . ; paniculae majoris effusae ramis patulis; . . . sepalis plerumque obtusis; . . . capsula . . . obtusiuscula mucronata breviter exserta)." How different was Gray's description of his *J. acuminatus* upon which alone the original *J. canadensis* α. *brevicaudatus* Engelm. (1866) rests: "*Stem erect* (10′–15′ high) . . . ; *panicle with rather slightly spreading branches* . . . ; sepals . . . very acute, one third or one half the length of the prismatic triangular and abruptly acute pod." Gray's description in English was closely paralleled by Engelmann's description in Latin in 1868 of his var. *coarctatus* which he was then substituting for his earlier var. *brevicaudatus:* "(½–1½ pedalibus) erectis; paniculae minoris coarctatae ramis erectis; . . . sepalis acutis seu raro obtusiusculis; . . . capsula . . . acutata longius exserta." Neither Engelmann, Gray, Coville, Buchenau nor any one else who understood the genus had any thought of confusing *J. acuminatus* Gray, not Michx. with *J. brachycephalus*. There are only a few specimens of this group in the Gray Herbarium dating back to 1865 and thus showing what Gray was calling *J. acuminatus* just prior to Engelmann's publication of *J. canadensis*, "α. *brevicaudatus* (J. acuminatus, Gray)." In *J. brachycephalus* there are 4 specimens: from Erie Co., New York, *A. Gray*, without an original identification but marked by John Carey "*J. acuminatus?*"; from Penn Yan, New York, *Sartwell* and from Dexter, New York, *Vasey*, the Sartwell specimen without name, the Vasey one originally called *J. paradoxus*, changed to *J. pelocarpus?*, and both marked by Carey "*J. acuminatus? capitulis parvis*"; a sheet from Jefferson Co., New York, *Vasey*, labeled *J. articulatus;* all of the specimens relabeled by Engelmann *J. canadensis* β. *brachycephalus*. Of *J. brevicaudatus* (Engelm.) Fern. or *J. coarctatus* (Engelm.) Buchenau there are likewise 4 of these older specimens: Essex Co., Massachusetts, *Oakes*, without name except in Engelmann's hand

"*J. canadensis* Gay, α. *brevicaudatus*, γ. *coarctatus*, G. E. 1866," the second name with a later pen-line through it; White Mts., New Hampshire, *Gray*, similarly without name on original label but marked by Engelmann as above; and two numbers (3 and 4) sent by Vasey from Dexter, New York as "*Juncus accuminatus*" and so accepted by Gray who made memoranda as to the source of the specimens and corrections of Vasey's unfortunate spelling; and these, like the others were marked by Engelmann *J. canadensis* var. *coarctatus*. It is thus unclear that the only plants Gray had before him which bore the unquestioned name *J. acuminatus* were specimens which Engelmann at first called *J. canadensis*, var. *brevicaudatus*, forma *coarctatus*, later var. *coarctatus*. That *J. acuminatus* of Gray, consequently *J. canadensis* α. *brevicaudatus* Engelm., therefore *J. brevicaudatus* (Engelm.) Fernald, is the plant Fernald meant when he transferred the name there can be no serious question.

As to Mackenzie's other contention, that in the absence of any identifiable type of Gay's *J, canadensis* α, the name *J. canadensis* should be used for his var. β. because the first specimen mentioned by Gay happens to belong to that plant, of course the International Rules of Nomenclature provide that "When a species or subdivision of a species is divided into two or more groups of the same nature, if one of the two forms was distinguished or described earlier than the other, the name is retained for that form" (Art. 47). It is, consequently, logical to accept the "alpha variety" as the type of a complex species; and when the var. β. was taken out as the coördinate species, *J. brevicaudatus*, naturally var. α was interpreted as *J. canadensis*.

Even though no extant specimen of Gay's *J. canadensis*, var. α can be found, Gay (or Laharpe) furnished a very vivid comparative note which Mackenzie did not quote. After the description of *J. canadensis* occurs this comment: "La variété α ressemble au *J. lampocarpos* γ, tandis que la variété β a le port du *J. ustulatus*." *J. lampocarpus* is the plant we call *J. articulatus* L. and *J. lampocarpus* γ of Laharpe is the extreme with "Spicis paucis, multifloris, densis, culmo foliisque duris,"[1] i. e. *J. lampocarpus*, var. *macrocephalus* (Viv.) Döll. An inflorescence of this plant, which Laharpe stated that *J. canadensis* var. α of Gay resembles, is shown in PLATE 198, FIG. 1, from a specimen collected in Hyères (*Raine*), and beside it (FIG. 2) is a panicle of the American plant which Engelmann, Coville and I have

[1] Laharpe, Mon. Jonc. 125 (1827).

identified as Gay's *J. canadensis*, var. α. In the absence of a type-specimen, Laharpe's note of the resemblance of the two is certainly pretty conclusive and little good can come by replacing this well-grounded interpretation by a new guess which at best simply shifts the names without adding anything of finality to the solution.

Juncus ustulatus Hoppe is treated by Buchenau, Rouy and other competent European students as one of the varieties of *J. alpinus* Vill. A characteristic inflorescence of this variety of *J. alpinus* (*J. ustulatus*) is shown in FIG. 3 (*Braun-Blanquet*, Fl. Raet. Exsicc. no. 318) and beside it a typical inflorescence of *J. brevicaudatus* (Engelm.) Fernald as FIG. 4 (Bathurst, New Brunswick, *S. F. Blake*, no. 5440). The pertinence of the original statement that Gay's *J. canadensis* β has the aspect of *J. ustulatus* is apparent. It should be clear, then, that when Engelmann stated that his *J. canadensis*, var. *brevicaudatus*, later called by him var. *coarctatus*, was Gay's *J. canadensis*, var. β, he had positive grounds for his identification and that when he originally based var. *brevicaudatus* upon Gray's *J. acuminatus* he was correctly associating the latter with *J. canadensis*, var. α of Gay. There is, then, no reasonable justification for shifting *J. brevicaudatus* to the synonymy of *J. brachycephalus*, as supposed by Mackenzie.

EXPLANATION OF PLATE 198

(All figures × 1)

Panicles of (FIG. 1) JUNCUS LAMPOCARPUS γ Laharpe (var. MACROCEPHALUS (Viv.) Döll) from La Plage, Hyères, France, *F. Raine;* (FIG. 2) J. CANADENSIS J. Gay from Chilmark, Massachusetts, *F. C. Seymour*, no. 1147; (FIG. 3) J. USTULATUS Hoppe (J. ALPINUS, var. MUCRONIFLORUS (Clairv.) Aschers. & Graebn.) from the Central Alps, *Braun-Blanquet*, Fl. Raet. Exsicc. no. 318; (FIG. 4) J. BREVICAUDATUS (Engelm.) Fernald from Bathurst, New Brunswick, *S. F. Blake*, no. 5440.

THE POLLINIZATION OF HABENARIA OBTUSATA.—The small, greenish white orchid, *Habenaria obtusata* (Pursh) Richardson, is a common plant of the Canadian forest from Newfoundland to Alaska. In the Athabaska-Great Slave Lake region of northwestern Canada it is not only extremely abundant, as shown by the writer's collections and observations, but it is also by far the most common of all the orchids growing there. On several occasions during the past three summer's botanizing in this region, mosquitoes have been found carrying the pollinia of this orchid, the sticky pads of the pollinia

being fastened to the heads of the insects near the base of the mouth parts as shown in the accompanying photographs. It is possible that the great abundance of the orchids is due to an efficient polliniza-

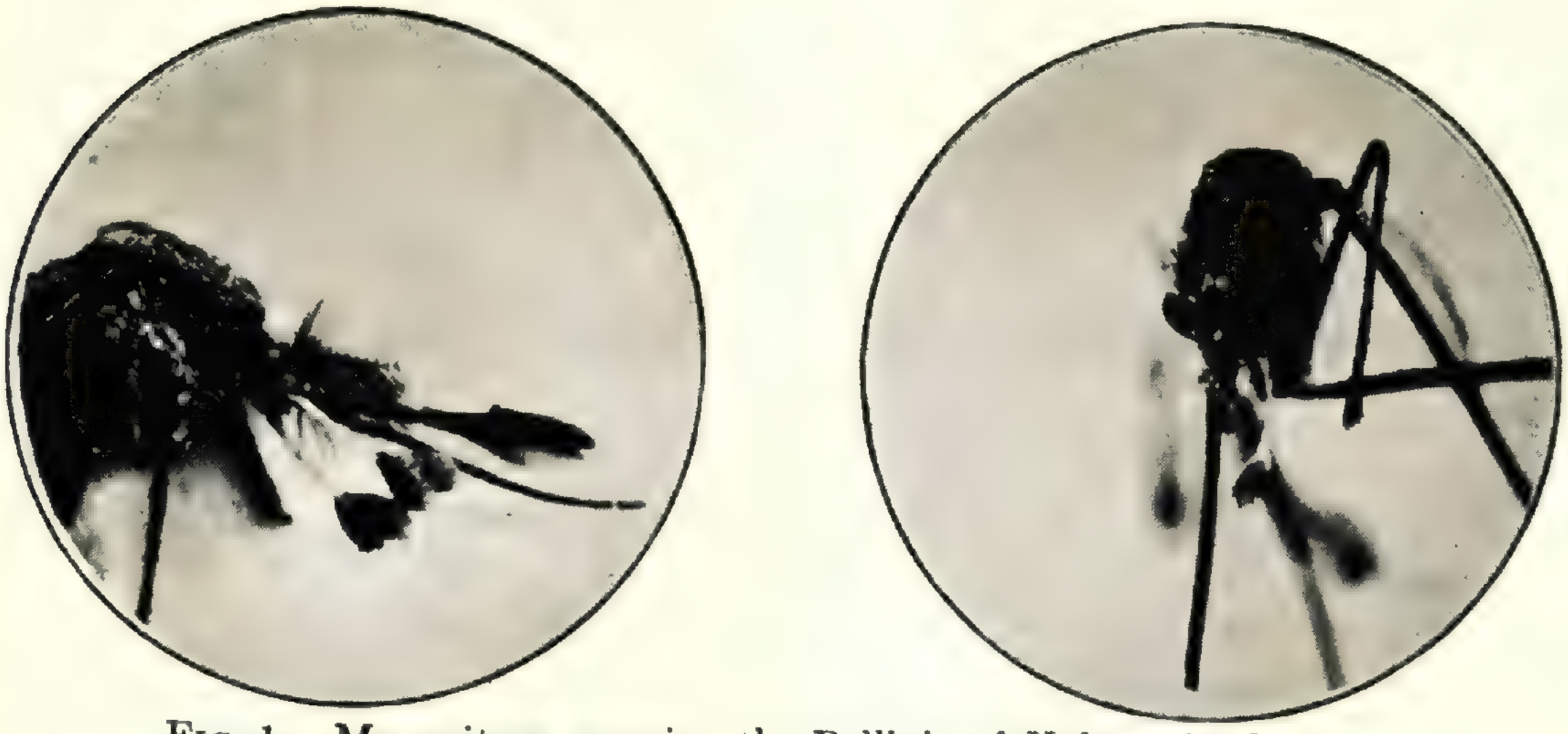

FIG. 1. Mosquitoes carrying the Pollinia of *Habenaria obtusata*.

tion carried on by the myriads of mosquitoes which inhabit the woods. The flowers produce sufficient scent and nectar to attract such sugar-loving insects.—HUGH M. RAUP, Harvard University.

A NEW SALVIASTRUM FROM THE EDWARDS PLATEAU OF TEXAS

V. L. CORY, *Grazing Research Botanist*

INTRODUCTION

While engaged in the loco survey of a portion of the Edwards Plateau region of Texas and on the occasion of investigating the southern limit of loco on Live Oak Draw in Crockett County, Texas, it became desirable to leave this Draw and cross over the divide to Howard Draw further east. Near the summit of the pass on a gravelly limestone ridge our attention was caught by some plants that seemingly were a species of *Penstemon* not hitherto collected by us, and the car was stopped to make a collection. The first plant reached revealed that it was a *Salviastrium* rather than a *Penstemon*, but that it was new to us and apparently new to science. Grateful acknowledgment is due Dr. Ivan M. Johnston of the Gray Herbarium for valuable suggestions in regard to this plant.

Description

Salviastrum **dolichanthum** Cory, sp. nov. A low suffrutescent plant 10–20 cm. tall; stems strict, commonly branched from the base, cinereous, covered with a close and dense indument of minute branching hairs, also conspicuously white-setose; leaves entire, firm, ascending, strict, cinereous with a dense indument of minute branching hairs, frequently ciliate, margins revolute, apex obtusish to somewhat acute, midrib evident but veins obscure, pale beneath; basal leaves narrowly oblanceolate becoming 5–6 cm. long and 3–6 mm. broad, below the middle gradually contracted to a slender petiole; cauline leaves linear or oblance-linear, 1–3.5 cm. long and 1–2 mm. broad, the uppermost bracts somewhat cuspidate at apex; flowers solitary in the axils and together forming a cylindrical bracted raceme of 10–20 flowers, the racemes being 5–10 cm. long; calyx at anthesis up to 12 mm. long, glabrescent, reticulately veined, villous-setose towards the base on the outside, conspicuously pilose in the throat within, its lobes lance-oblong, ciliate and cuspidate; corolla blue or purple, subsalverform, 3–3.5 cm. long, pubescent outside, its tube about twice the length of the calyx, 2–2.5 cm. long and up to 2 mm. thick at the base, gradually expanding and curving towards the apex where it is up to 3 mm. thick, sparsely and inconspicuously villous inside just above the base but otherwise glabrous within, its throat short, its limb oblique; filaments of the upper fertile pair of stamens up to 2 cm. long, attached in corolla-throat up to 2.4 cm. above base of corolla; connective up to 1 mm. long, thickened; both anther cells polliniferous, 1 mm. long; the lower pair of stamens represented by abortive rudiments up to 1 mm. long; styles glabrous, filiform, extruded, unequally 2-lobed, the slender lobes being 1.5–2.5 mm. long; nutlets smooth, brown, subglobose, up to 2 mm. in diameter.

A number of plants in flower and in fruit were collected April 20, 1929 from a gravelly, limestone ridge forming the divide between Live Oak and Howard Draws in Crockett County, Texas, 32 miles northwest of Ozona. As similar habitats were not visited collections of this species from other localities were not made. The TYPE specimen, No. 675, is in the herbarium of the Texas Agricultural Experiment Station at College Station, Texas. Isotypic material, No. 674, has been deposited in the Gray Herbarium.

This species is related to *Salviastrum texanum* Scheele, which occurs commonly throughout the Edwards Plateau, but differs in its extremely elongated and less irregular corolla, and in the shorter, thickened connectives of the anthers. It is a very distinct new species.

Texas Agricultural Experiment Station.

Volume 32, no. 375, including pages 35 to 62 and plate 195, was issued 8 March, 1930.

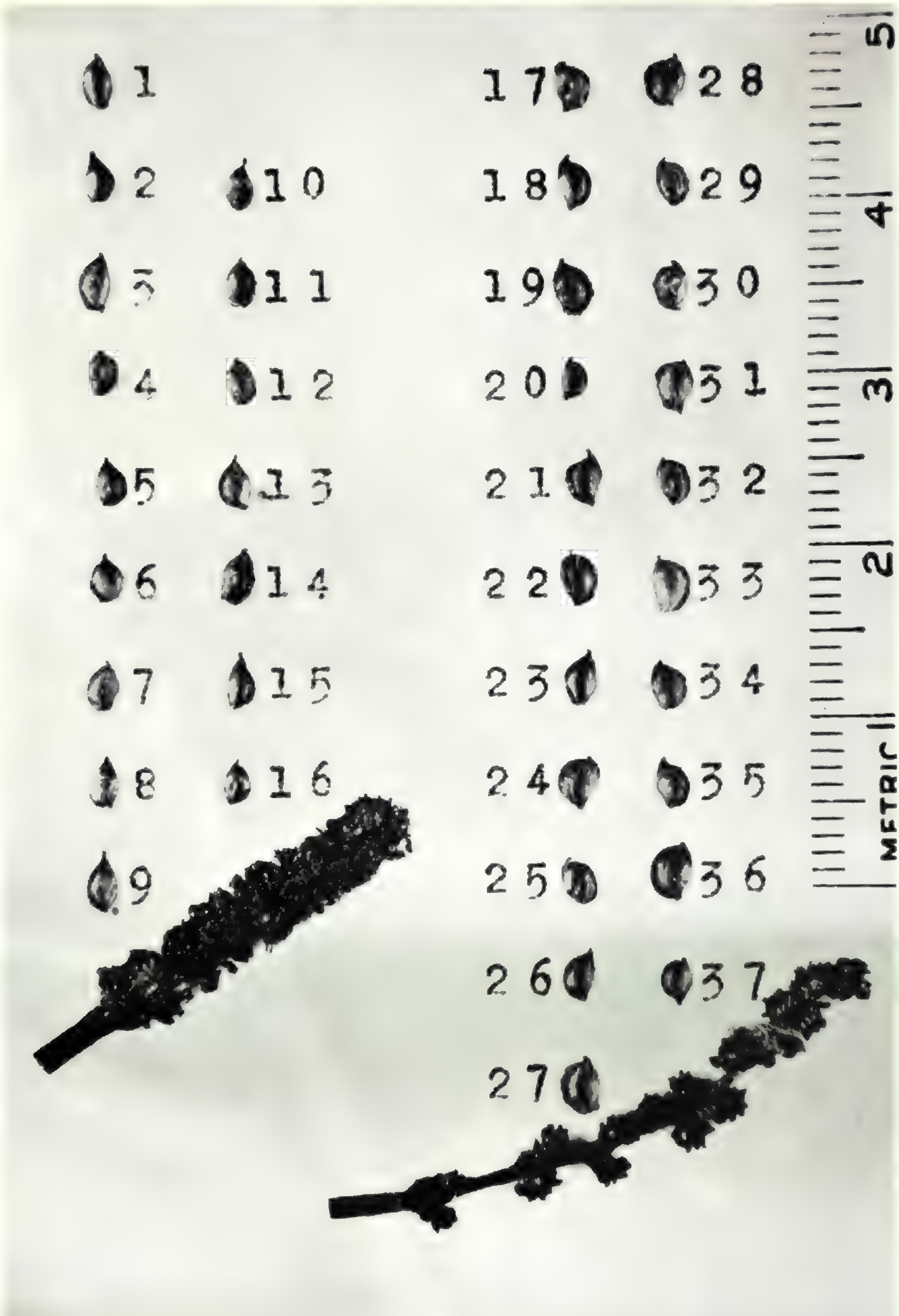

Photo. by H. M. Raup and A. N. Steward.

POTAMOGETON ALPINUS at left, × 2; P. MICROSTACHYS at right, × 2.

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4

3

Photo. by H. M. Raup.

JUNCUS: FIG. 1, J. LAMPOCARPUS, var. MACROCEPHALUS; FIG. 2, J. CANADENSIS; FIG. 3, J. ALPINUS, var. MUCRONIFLORUS (J. USTULATUS); FIG. 4, J. BREVICAUDATUS; all × 1.

Rhodora

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CLADONIA PLEUROTA, foliose form (FIG. 1); C. DIGITATA, var. GLABRATA (FIG. 2); C. ACUMINATA (FIG. 3).

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 32. May, 1930. No. 377.

SOME CLADONIAE FROM THE VALLEY OF THE CAP CHAT RIVER AND VICINITY, GASPÉ PENINSULA, QUEBEC

ARTHUR F. ALLEN

(Plate 199)

THE following list includes species of lichens of the genus *Cladonia*, collected by the writer during July and August, 1928, in the valley of the Cap Chat River and on Mt. Logan, a nearby peak of the Shickshock Mts., in Matane County, Province of Quebec, near the north shore of the Gaspé Peninsula. Although many of the species mentioned will be found in the list of lichens of the Gaspé Peninsula published by Dr. C. W. Dodge,[1] they have not been omitted, as the present list supplies new forms and stations.

SPECIES COLLECTED (those previously listed by Dr. Dodge indicated by an asterisk):

*CLADONIA RANGIFERINA (L.) Web., valley of the Cap Chat River; summit of Mt. Logan.

*C. IMPEXA Harm. var. LAXIUSCULA Del., valley of the Cap Chat River.

C. MITIS Sandst. Forma PROSTRATA Sandst., valley of the Cap Chat River; summit of Mt. Logan.

*C. BACILLARIS (Ach.) Nyl., valley of the Cap Chat River.

*C. DEFORMIS Hoffm., valley of the Cap Chat River; summit of Mt. Logan. Forma EXTENSA (Hoffm.) Wainio, summit of Mt. Logan. Forma CRENULATA Ach., valley of the Cap Chat River.

*C. CRISTATELLA Tuck. Forma BEAUVOISII (Del.) Wainio, valley of the Cap Chat River; summit of Mt. Logan. Forma VESTITA Tuck., valley of the Cap Chat River. Forma OCHROCARPA Tuck., valley of Cap Chat River.

[1] Dodge, RHODORA, Vol. 28 (1926) pp. 156–161, 205–207, 225–232.

*C. COCCIFERA (L.) Zopf., summit of Mt. Logan; valley of the Cap Chat River. Var. STEMMATINA Ach., summit of Mt. Logan.

*C. PLEUROTA (Floerke) Schaer., summit of Mt. Logan; valley of the Cap Chat River. Mod. DECORATA Wainio, summit of Mt. Logan.

*C. DIGITATA Schaer., valley of the Cap Chat River. Var. GLABRATA (Del.) Wainio, valley of the Cap Chat River.

*C. UNCIALIS (L.) Web., summit of Mt. Logan.

C. AMAUROCRAEA (Floerke) Schaer., summit of Mt. Logan. Forma OXYCERAS (Ach.) Wainio, summit of Mt. Logan.

C. FURCATA (Huds.) Schrad., summit of Mt. Logan. Var. RACEMOSA (Hoffm.) Floerke, summit of Mt. Logan.

*C. SCABRIUSCULA (Del.) Leight. Forma SURRECTA Floerke, valley of the Cap Chat River.

C. MULTIFORMIS Merrill, summit of Mt. Logan.

*C. CRISPATA (Ach.) Flot., summit of Mt. Logan. Forma DILACERATA (Schaer.) Malbr., valley of the Cap Chat River. Forma VIRGATA (Ach.) Wainio, valley of the Cap Chat River. Forma KAIRAMOI Wainio, valley of the Cap Chat River.

*C. SQUAMOSA (Scop.) Hoffm., valley of the Cap Chat River; summit of Mt. Logan. Forma DENTICOLLIS (Hoffm.) Floerke, summit of Mt. Logan.

*C. CENOTEA (Ach.) Schaer. var. CROSSOTA (Ach.) Nyl., summit of Mt. Logan.

C. INVISA Robbins, n. sp., valley of the Cap Chat River.

C. CARIOSA (Ach.) Spreng. Forma CRIBROSA (Wallr.) Wainio, valley of the Cap Chat River. Forma CORTICATA Wainio, valley of the Cap Chat River.

C. ACUMINATA (Ach.) Wainio, valley of the Cap Chat River; summit of Mt. Logan.

*C. GRACILIS (L.) Willd. var. DILATATA (Hoffm.) Wainio, valley of the Cap Chat River. Forma ANTHOCEPHALA Sandst., valley of the Cap Chat River. Forma MESOTHETA Wallr., valley of the Cap Chat River. Var. CHORDALIS (Floerke) Schaer., valley of the Cap Chat River. Var. CHORDALIS-ASPERA Floerke, valley of the Cap Chat River.

*C. CORNUTA (L.) Schaer., summit of Mt. Logan.

*C. VERTICILLATA (Hoffm.) Schaer., valley of the Cap Chat River. Var. EVOLUTA (Th.) Fr., valley of the Cap Chat River. Forma PHYLLOPHORA (Ehrh.) Flot., valley of the Cap Chat River.

*C. DEGENERANS (Floerke) Spreng. Forma PHYLLOPHORA (Ehrh.) Flot., valley of the Cap Chat River.

*C. CHLOROPHAEA (Floerke) Spreng., valley of the Cap Chat River; summit of Mt. Logan.

C. **conista** (Ach.) Robbins, n. comb.,[1] valley of the Cap Chat River.

[1] *Cenomyce fimbriata* β. *conista* Ach. Syn. Lich. 257. 1814. *Cladonia fimbriata* f. *conista* Nyl. Addit. Lich. Boliv. 370. 1862.

*C. FIMBRIATA (L.) Fr. Forma SIMPLEX (Weis.) Flot., valley of the Cap Chat River; summit of Mt. Logan.

C. NEMOXYNA (Ach.) Zopf., valley of the Cap Chat River; summit of Mt. Logan.

*C. CONIOCRAEA (Floerke) Sandst., valley of the Cap Chat River; summit Mt. Logan. Forma CERATODES (Flk.) Wainio, valley of the Cap Chat River. Forma TRUNCATA (Flk.) Wainio, valley of the Cap Chat River. Forma PYCNOTHELIZA (Nyl.) Wainio, valley of the Cap Chat River.

*C. CORNUTORADIATA (Coem.) Wainio, valley Cap Chat River. Forma SUBULATA (L.) Wainio, valley of the Cap Chat River.

C. BORBONICA (Del.) Nyl., valley of the Cap Chat River.

The bulk of the foregoing species need but little comment, being, for the most part, well known inhabitants of the colder or temperate regions of the British Isles, Europe, Siberia, Greenland, Labrador, Canada, and, in some cases, South America and Australia—nearly or quite cosmopolitan. An exception is the well known North American endemic, *C. cristatella* Tuck. A few, however, deserve further mention.

A hitherto unknown form, found by C. A. Robbins in the material collected, was named by him *C. invisa*. The description is as follows.

CLADONIA **invisa,**[1] Robbins, sp. nov., primary squamules small to medium size, thickish, rounded, becoming more or less lobate-divided, glaucescent above, white beneath, KOH+; podetia stout, short—5 mm. tall (taller?), corticate, usually naked and semipellucid above, divided into short obtuse branches, always terminated by comparatively large brownish or darker apothecia KOH+. Suggestive of *C. caespiticia* (without caespitose habit, podetia stouter, better developed, with thicker and more rounded squamules), or a dwarf *C. cariosa* (without characteristic reaction). TYPE growing with *C. bacillaris* (Ach.) Nyl. from base of tree, valley of the Cap Chat River, Matane County, QUEBEC.

This same locality yielded also *Cladonia digitata* var. *glabrata* (Del.) Wainio (FIG. 2) a species rare in both Europe and America, collected by Wainio in[2] Finland and also found in France[3]. *Cladonia acuminata* (Ach.) Nyl. (FIG. 3) was discovered growing in an extensive colony (twenty or more square feet) with other lichens, as *Stereocaulon tomentosum* Fr. and a species of moss, *Rhacomitrium canescens* (Timm.) Brid. The colony occupied part of a gravelly beach obviously

[1] Deposited in the Farlow Herbarium, Harvard University.

[2] Wainio, E. A., *Monographia Cladoniarum Universalis*. Helsingfors, Vol. I, p. 133.

[3] Found also in Alaska by L. J. Palmer (Herb. G. K. Merrill).

flooded at times of high water. Wainio[1] gives the range of this lichen as follows, stating that it is imperfectly understood: Finland, Russian Lapland, mountains of Scotland, and Ireland, Switzerland, Tirol, Siberia, Port Clarence, on Behring Strait, and Kerguelen Island.[2] It is clearly an inhabitant of subarctic, subantarctic, alpine and subalpine regions.

Among other species found in the Cap Chat Valley, *Cladonia borbonica* (Del.) Nyl. and *Cladonia conista* (Ach.) Robbins deserve mention. Wainio[3] gives the distribution of the former as Australia, Java, and the Islands of Bourbon (Reunion), Mauritius and Madagascar, with stations at Orizaba, Mexico, Cuba, Dominica, St. Vincent, Minas Geraes, Brazil. It is found also in Costa Rica, Florida, Alabama, and Vermont with a station in the Hawaiian Islands.[4]

On the summit of Mt. Logan a collection was made of a single podetium (Fig. 1) quite unique in conformation, and, so far as known, not duplicated. The description is briefly as follows:

Primary thallus wanting; podetium unbranched, 2.3 cm. tall, actual diameter 2 mm., but increased to 8 mm. by a thick growth of large digitate squamules which completely envelope it; abruptly scyphiform at the summit, cup 1.5 cm. in diameter, squamulose on both outer and inner surfaces; nearly sterile but with indications of young red apothecia on periphery, KOH+.

This specimen was classified by Robbins as a foliose and aberrant form of *C. pleurota* (Floerk.) Schaer.

The writer wishes to make grateful acknowledgement of the assistance of Mr. C. A. Robbins of Onset, Mass., who examined all material collected and determined many of the species listed. Valuable aid in preparation of manuscript was given by Dr. C. W. Dodge, and suggestions concerning the plate by Dr. W. H. Weston, Jr.

Farlow Herbarium,
Harvard University.

Explanation of Plate 199

Fig. 1, foliose form of Cladonia pleurota from summit of Mt. Logan, Quebec; fig. 2, C. digitata, var. glabrata from Matane County, Quebec; fig. 3, C. acuminata from Matane County, Quebec.

[1] Ibid., Vol. 2, p. 77.
[2] See Hooker, J. D., *Botany of Kerguelen Island*. Royal Soc. London. Phil. Trans. Vol. 168 (extra vol.). 1897. pp. 46–52.
[3] Wainio, E. A. *Mono. Clad. Univ.*, Vol. 2, p. 344.
[4] Stations recorded from specimens in Farlow Herbarium, Harvard University.

LEAF-VARIATION IN LIQUIDAMBAR STYRACIFLUA L.

THEO. HOLM

(Plates 200 and 201)

ENDLICHER was the first author to remove the genera *Liquidambar* and *Altingia* from the *Hamamelideae*, referring these genera to a family of their own: *Balsamifluae* "*Juliflorae* cohors II apetalae," between *Platanaceae* and *Salicineae*. This view became supported by Van Tieghem,[1] who pointed out the important fact that these two genera possess a system of resin-ducts traversing the primary leptome of the roots and the primary hadrome of the stems and leaves. In this manner the two genera actually combine the root-structure of the *Anacardiaceae* with the stem- and leaf-structure of the *Dipterocarpeae*. By Van Tieghem they were referred to a new family: *Liquidambareae*, between *Dipterocarpeae* and *Simarubeae*.

With regard to *Liquidambar*, our native species *L. Styraciflua* L. shows a remarkable variation in the leaf-shape, which is not mentioned in the botanical manuals, and which is very characteristic of the species. The leaves are by Bentham and Hooker described as "palmati lobata," and by Gray as: "rounded, deeply 5–7 lobed, glandular-serrate, the lobes pointed." None of these terms, however, give us the characteristic shape of the leaf, when compared with similar palmately lobed forms, and the term proposed by Linné: "foliis palmato-angulatis" is much more expressive.

We have in *Liquidambar* a variation corresponding with that of *Liriodendron*,[2] when we compare the foliage of the seedlings with that of the mature tree, and also, to some extent, when we compare the leaves according to their position on the branches. One character remains constant in *Liquidambar*, however, the margin being always serrate. The typical shape of the leaf (FIG. 9) is five-lobed, the two basal lobes forming an angle of 180°, and there is no indication of any secondary lobes. We consider this to represent the typical form, because it is the most frequent on the mature tree, and because it is borne on the flowering branches. But beside this, the typical form, there are many others, of which several appear on the mature tree, intermixed with the typical, or they may represent the only foliage

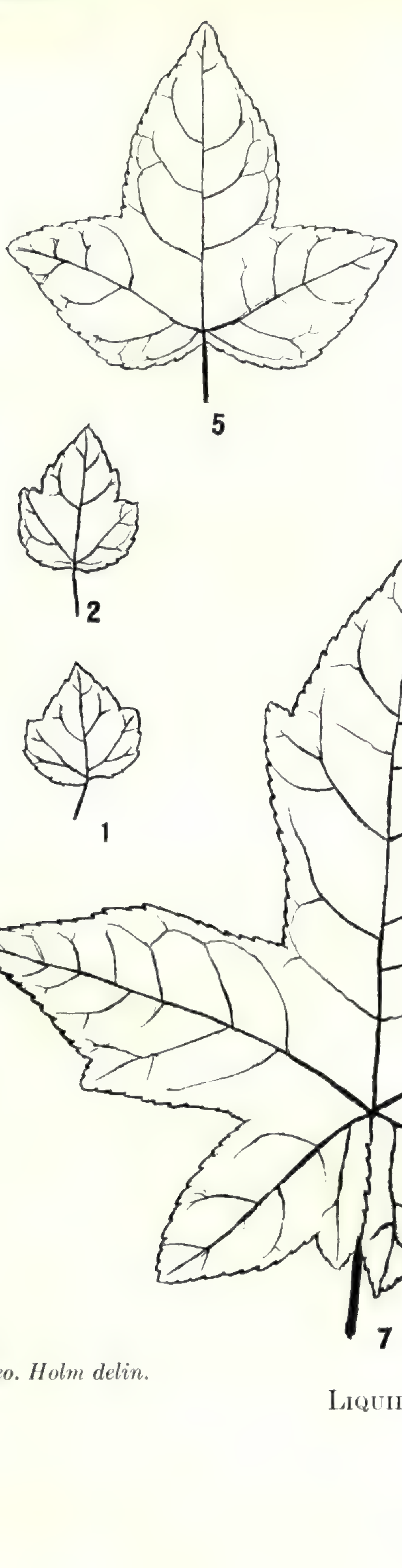
[1] Van Tieghem, Ph. Second mémoire sur les canaux scéréteurs des plantes. Ann. d. Sc. Nat. Bot. Sér. 7. Vol. 1. Paris 1885, p. 80.

[2] Holm. Theo. Notes on the leaves of Liriodendron. Proceed. U. S. National Mus. Vol. XIII, no. 794. Washington 1890, pp. 15–35.

of the species, when a mere shrub or a seedling. The variation may be expressed by a smaller number of lobes, only three (FIG. 5), or by the blade being entire, ovate (FIGS. 3 and 10); or the number of lobes may be increased by the development of secondary lobes borne on the primary (FIGS. 6, 7 and 8); finally the basal lobes may be directed downward, forming a distinct sinus of very variable depth and width.

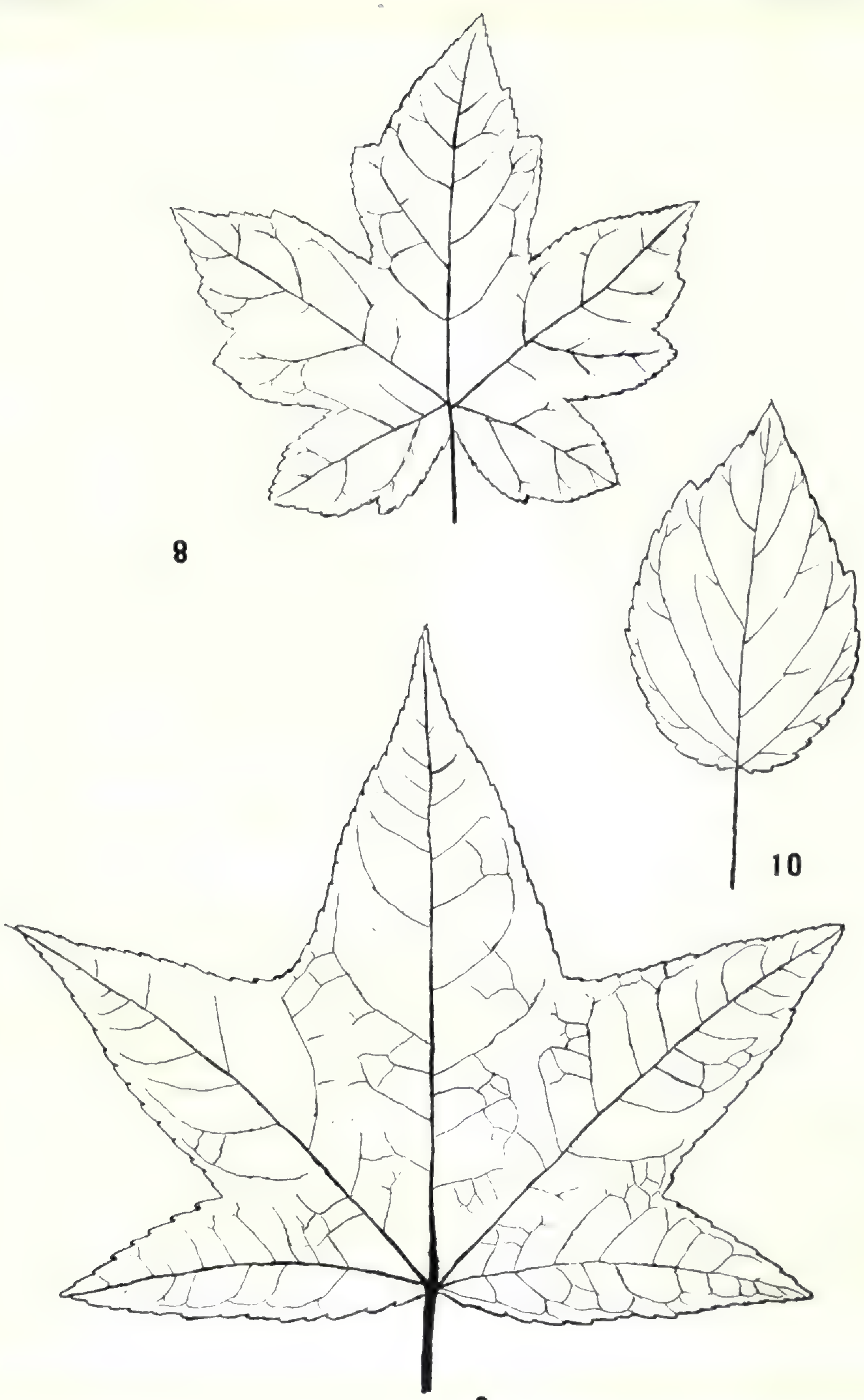
There is thus ample room for variation, notably with reference to the number and distribution of the secondary lobes, a variation fluctuating between the simple, ovate leaf and the form with 17 lobes, 5 primary and 12 secondary, which is not infrequent. But the number of primary lobes, 5, seems to be constant or at least the most general, for we have only found a few leaves on a single shrub, where seven ribs proceeded directly from the apex of the petiole, and where the number of secondary lobes aggregated 14, making a total of 21 lobes; the size of this leaf was 15 cm. in length, 13 cm. in width, and the shrub measured about 40 cm. in height with only four shoots. The size of the typical leaf with five lobes, and with no indication of secondary lobation, is about 17 cm. in length and 22 cm. in width, or more.

The seedling has a long, thin primary root, and the hypocotyl is relatively tall (about 4 cm.), erect; the cotyledons are oblong and obtuse with short petioles; their leaf blades measure about 15 mm. in length, and 7 mm. in width. From three to four leaves are developed in the first season, and they vary from entire, ovate (FIG. 3), to more or less distinctly three-lobed, but the lateral lobes are very short and obtuse (FIGS. 1–2). In the second year the stem remains unbranched, and may attain a height of 18 cm. bearing about ten leaves. Of these the lowermost is generally entire or with two lateral lobes, very short and obtuse; the other leaves are five-lobed, but the lobes are very broad and short-pointed. In specimens of the same age, but of a more vigorous growth, some of the leaves may show indication of secondary lobes, especially on the central lobe, thus representing the form shown in FIG. 6, which also is from a specimen in its second year. Finally the form, shown in FIG. 8, may be observed in similar, unbranched specimens, where the primary lobes bear short, but very distinct secondary lobes, making a total of 11 lobes, 5 primary, 6 secondary. Characteristic of the lobed leaves of the seedlings in the second year is the distinct basal sinus, especially deep and narrow in the leaves with secondary lobation (FIGS. 6 and 8).



Theo. Holm delin.

LIQUIDAMBAR



Theo. Holm delin.

LIQUIDAMBAR

When the stem begins to branch at the age of about five years, the height may be about one meter, and the foliage is then very different from that of younger, unbranched specimens. The first developed leaves, at the base of the branches, are small, three-lobed, a little larger than the one shown in FIG. 2, and with the central lobe narrower and a little longer. All the other leaves are large, five-lobed, but with the lobes relatively much broader than in the typical form, and with distinct secondary lobes like the leaf figured in FIG. 8. In these leaves the basal sinus is narrow and deep; in some of them the secondary lobes of the basal primary pair may overlap each other (FIG. 7), thus completely covering the sinus; some of the largest leaves may have seven primary lobes, and all the lobes bearing secondary pairs; the number of lobes may thus aggregate a total of 21, as described above. Not a single typical leaf was to be observed on shrubs of that age and height (one m.). In shrubs of greater height, about two meters, the leaves are smaller than in the preceding specimens, and the lobation is much less developed, frequently confined to the central lobe, and in all the leaves the basal sinus is deep and narrow; no typical leaves were observed. Characteristic of the foliage of the young shrubs are thus the relatively broad and short primary lobes, bearing several secondary lobes; besides that the basal sinus is constantly deep and narrow.

For several years the species retains the form of a large shrub, measuring four to five m. in height, and the foliage begins now to approach the type of the mature tree. The leaves are ample, and two types are present: one with the five primary lobes broad at the base, with a small, secondary lobe only on the basal pair, and with the sinus forming an obtuse angle; or with the primary lobes elliptical, tapering gradually to the base, with small, secondary lobes, on the central especially, and with a relatively narrow sinus at the base of the blade. Of these the latter form is less frequent than the former, which resembles the typical, except that the basal, primary lobes bear secondary ones, and that the sinus represents an obtuse angle instead of an angle of 180°.

When the species has reached maturity, and has become the stately, large tree so very characteristic of the North American forests from Connecticut to Illinois, and south to Florida and Texas, the typical leaf-shape (FIG. 9) is predominant. In the spring, the month of April, the flowers appear, and at that time all the leaves represent

the typical form. Some few months later variation becomes much in evidence, and we may then observe some long shoots with the lowermost leaf entire (FIG. 10); moreover, three-lobed leaves may comprise almost the complete foliage of dwarf-shoots, here and there; in these three-lobed leaves the lateral lobes form a broad, convex arch at the base with no indication of any sinus. Or on the same tree leaves of ample size may be observed with the lobes, especially the central, showing a slight indication of seconday lobatrion, and with a distinct basal sinus. It is interesting to compare the foliage of the long, slender branches where the basal leaves are of the typical form, the succeeding with indication of secondary lobes, and the apical eleven-lobed (five primary, six secondary), and with a deep sinus; such cases are frequent on the mature tree. When trees have been cut down, shoots may develop from the stump, and the leaves are generally large and with several secondary lobes, besides with a deep, narrow sinus, resembling the form drawn in FIG. 7. There is thus a well marked variation to be observed even on the mature tree, but the typical form of the leaf is constantly to be found on the floral shoots themselves.

A variety of *L. Styraciflua* has been found in Mexico: "mexicana," and is figured by Oersted;[1] the plate shows one branch with four leaves, of which only the uppermost is three-lobed, all the others are five-lobed; but in this three-lobed leaf, the lateral lobes do not form an arch at the base, but taper gradually downward into the petiole.

The leaf-variation in *Liquidambar* is really remarkable, when we consider the fact that the mature tree shows several characteristic forms of leaves, as is also the case in *Liriodendron*, but to a smaller extent. In common with many other genera of trees with lobed or parted leaves, *Liquidambar* has the foliage of the seedling representing a very simple form, destitute of lobation. As we have described in a previously published paper[2] the seedlings of many trees are developed in the shade, and the relative size and outline of the primary leaves agrees well with the nature of the environment: diffuse light and a calm atmosphere, sometimes excellently illustrated also by the internal structure. We remember for instance *Liriodendron*, but furthermore several species of *Quercus* (*palustris* Du Roi, *rubra* L.

[1] Oersted, A. S. L'Amérique centrale. Prem. livr. Copenhague, 1863, planche 11.
[2] Holm, Theo. Sciaphilous plant types. Beiheft. Botan. Centralbl. Vol. 44. Dresden, 1927.

etc.); in *Acer saccharum* Marsh. the first leaves are either entire with the margin dentate, or slightly three-lobed; in *Negundo aceroides* Moench the first leaves are simple with the margin entire or serrate, while the typical leaves are pinnate; similar, simple leaves occur also in species of *Carya*, for instance *glabra* (Mill.) Spach; in *Platanus occidentalis* L. the first leaves are cuneate, and entire. A still more remarkable structure is represented by *Cecropia peltata* L., where the first leaves of the seedling are ovate, the succeeding three-lobed, thus very different from the leaves of the mature tree, which are peltate, almost orbicular in outline and divided into 9–11 radiating segments. In *Carica Papaya* L. the first leaf of the seedling is ovate, acuminate, with the margin entire; the second leaf is three-lobed with the lobes acuminate, while in the mature tree the ample leaves are deeply seven-lobed, the lobes pinnatifid and pointed. Several other cases might be cited, but it, nevertheless, appears to be characteristic of *Liquidambar* in contradistinction to these examples cited, except *Liriodendron*, that the variation is continued even when the tree has reached maturity. The fact that the floral shoots in *Liquidambar* always bear the typical form of leaves may depend on the different space inside the buds, when we compare the floral buds with the purely vegetative. In the former the staminate and pistillate inflorescences, developed at the same time, occupy the greater space in the bud; thus the subtending leaves, on account of the pressure, become simply five-lobed, and with the lobes narrow.

It may be mentioned at this place that the leaves sometimes show small, but dense, tufts of hairs on the lower face, in the angles of the larger veins, but only at the very base of the blade; these hairs are mostly pluricellular, *i. e.* consisting of several cells in a single row, and wherever these tufts of hairs are developed the epidermis shows several strata of cork, which may possibly indicate the development of acaro-domatia, so very frequent in trees of various families as described by Lundstroem.[1]

We have mentioned in the preceding that the foliage of the seedlings in *Liquidambar* corresponds with that of several other trees developed in the shade, so far as concerns the outline. Furthermore, we have observed that the internal structure resembles that of sciaphilous plants. The characters are as follows:

[1] Lundstroem, Axel. Die Anpassungen der Pflanzen an Thiere. Nova Acta Reg. Soc. Upsala. Ser. 3. 1887.

1. The typical leaf of the tree.

Epidermis: lateral cell-walls straight on ventral face, undulate on dorsal.

Chlorenchyma: two layers of compact palisade-cells, and a pneumatic tissue of about seven, more open strata.

Collenchyma: several hypodermal strata above and beneath the primary veins.

Stereome: a closed sheath around the mestome-strands of the primary veins.

Mestome-strand of midrib: three strands fused together so as to form an apparently single "concentric," in this case a perileptomatic strand with a central pith containing three resin-ducts.

2. The leaves of the seedling in the first year.

Epidermis: lateral cell-walls undulate on both faces.

Chlorenchyma: almost homogeneous of isodiametric cells, here and there with one layer of short, plump palisades; pneumatic tissue of four strata, more open.

Collenchyma: only one hypodermal layer beneath the midrib.

Stereome: a separate, open arch on the leptome-side, and a separate, small strand, covering the hadrome.

Mestome-strand of midrib: one single strand, arch-shaped, open on the ventral face, with one resin-duct.

Clinton, Maryland.

Explanation of Plates 200 and 201

Plate 200. Liquidambar Styraciflua L. Figs. 1–3, leaves of seedlings in the first year. Fig. 4, leaf of a small, unbranched specimen, 25 cm. in height. Fig. 5, leaf of a shrub, 1 m. in height. Fig. 6, leaf of a small specimen, 25 cm. in height. Fig. 7, leaf of a shrub, 1 m. in height, from the same branch as the leaf figured in fig. 5.

Plate 201. Liquidambar Styraciflua L. Fig. 8, leaf of a small, unbranched specimen with in all five leaves; the leaf figured is the basal. Fig. 9, leaf of a large tree, showing the typical shape. Fig. 10, leaf of a large tree, the lowermost on a branch near the inflorescence; the other leaves were normal, five-lobed. All the figures are two-thirds of the natural size.

EUPHORBIA ESULA AS A WEED IN NEW YORK STATE.

W. C. Muenscher

Among that host of troublesome exotic weeds which have become established in our country is the Leafy Spurge, *Euphorbia Esula* L. Apparently this perennial weed is not only very persistent where it has taken a foothold, but is spreading rapidly into new areas.

Our manuals and floras give only a very imperfect idea of its distribution, but indications are that it may be already widely dis-

tributed in the northern United States. Available records indicate that it has been found in Maine, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Michigan, Wisconsin, Minnesota, North Dakota, and Colorado. House[1] did not include *Euphorbia Esula* in his "Flora of New York State." Taylor[2] in the "Flora of the Vicinity of New York" mentions it as occurring as a rare weed at Redding, Connecticut, but does not credit it to New York State.

Leafy Spurge is a perennial which produces large numbers of viable seeds and also spreads by slender creeping roots which send up new shoots in great profusion. Propagation by the roots is very rapid, especially when they are broken and dragged about a field with harrows and cultivators. Every piece of root, even though it is only one centimeter long, is capable of producing a new plant and a new center from which the weed spreads. In most places where it has become established, it has become a very serious pest in meadows as well as in cultivated land.

The following notes upon the distribution of this weed in New York State are based largely upon field observations by the writer and inquiries and specimens from farmers who have been confronted with the problem of its control. Unless otherwise indicated, the numbers refer to specimens collected by the writer and deposited in the herbarium of Cornell University.

ORANGE COUNTY: overrunning meadows and fields near Rock Tavern, New Windsor, 15,735 (1924); common and spreading in fields, meadows and along roadsides west of Newburgh, 15,736 (1924); in meadows and along roadside near the Middletown country club, Middletown, 15,737 (1924). ULSTER COUNTY: common in a meadow near Kingston, *H. P. Beals* (1925). SULLIVAN COUNTY: common in meadows and along roadside south of Bloomington, 16,217 (1925). DUTCHESS COUNTY: common and spreading in grain fields, meadows and pastures, *H. I. Hall* (1922–1927). COLUMBIA COUNTY: a large patch in a meadow near Hillsdale, 16,216 (1925). ALBANY COUNTY: common in an oatfield at Guilderland Center, *H. D. House*, New York State Herbarium, 10,787 (1925). HERKIMER COUNTY: in a field near Little Falls, *C. A. Casely*. ST. LAWRENCE COUNTY: one colony in a hayfield near Potsdam, probably extinct, *O. P. Phelps*, C. U.,[3] (1925). TOMPKINS COUNTY: on a hillside north of Ithaca, *L. H. MacDaniels & A. J. Eames*, C. U., 4493 (1915). CAYUGA

[1] House, H. D. Annotated list of the ferns and flowering plants of New York State. N. Y. State Mus. Bull. 254. 1924.

[2] Taylor, Norman. Flora of the Vicinity of New York. Mem. N. Y. Bot. Gard. 4: 1–683. 1915.

[3] C. U. = Herbarium of Cornell University.

County: in cultivated fields and grassland, about three miles east of Aurora (1929). According to a local resident it was first noticed here in 1923. Genesee County: abundant along roadside near Bergen, *A. E. Perkins*, C. U. (1929).

Fig. 1. Distribution of Euphorbia Esula in New York State.

These distribution records, also indicated on the map in figure 1, show that the Leafy Spurge is already known to be established in at least eleven counties in New York State: it is most abundant and troublesome in the southeastern counties but it is also found in scattered counties extending northward to the St. Lawrence River and westward almost to Lake Erie. More intensive field observations would probably show that it is already in some of the other counties. The rate at which this weed produces seed and spreads indicates that unless extreme measures are taken to eradicate new infestations, it is likely to become a much more common weed pest in the future.

Department of Botany,
Cornell University.

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THE NEW ENGLAND BOTANICAL CLUB

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A FEW NOTEWORTHY PLANTS FROM FALMOUTH, MASSACHUSETTS

John M. Fogg, Jr.

From 1923 to 1928, inclusive, the writer spent all or a part of each summer at the Marine Biological Laboratory at Woods Hole, Barnstable County, Massachusetts. During these six years, considerable attention was paid to the vascular flora of the region and many collecting trips were made not only to the adjacent islands but to various localities in Falmouth, Mashpee, Sandwich, and Bourne.

As invariably happens when such a study is made (and this is apparently as true of a carefully worked region as of one which has been little visited by botanists), new stations have been discovered for several interesting species and significant extensions in ranges have been made for others. A few of these observations are here recorded with the hope that they may contribute toward a clearer understanding of the problems of plant distribution as exhibited in southeastern New England.

The western portion of Cape Cod, which includes the four townships mentioned above, is found to differ botanically as well as geologically and topographically from the rest of Barnstable County. This "Upper Cape," as it is often referred to, is made up of a line of morainal hills which extends, in a general north and south direction, from Woods Hole to the Cape Cod Canal. These hills are, for the most part, heavily wooded and present an appearance which is in rather marked contrast to the low, sandy, treeless reaches of that portion of Cape Cod lying to the east. That this Upper Cape supports a flora which likewise differs from that of the areas eastward is borne out by a detailed examination of the characteristic herbaceous plants

of the region, as well as by the superficial aspect of the trees and shrubs. The prevailing tone of the flora of the central portion of Cape Cod is that of the southern coastal plain (a fact clearly established by the discerning work of Professor M. L. Fernald) whereas the geographic relations of most of the plants from the region under present consideration are rather with a widely distributed continental flora. The various factors underlying this differential distribution have been made the subject of investigation by the writer and the conclusions to which a study of the glacial history of the area have led him are summarized in a report which awaits immediate publication in Rhodora.

The continental affinities of the flora of the Upper Cape have been long suspected by Fernald and are demonstrated by his own field observations as well as those of his associates. Dr. H. K. Svenson, for example, has noted the occurrence in Sandwich of such species as *Polypodium virginianum*, *Polystichum achrostichoides*, *Thelypteris Phegopteris*, *Lycopodium clavatum* and *L. lucidulum*.[1] In the same paper *Najas guadalupensis* and *Aster nemoralis* are reported from Falmouth. These are all plants which are rare or absent elsewhere in Barnstable County and which are more representative of the richer soils of the mainland proper. Many of the finds herein recorded are of a similar nature and merit interest mainly as further illustrations of the relationship just indicated.

The following records are substantiated by specimens collected by the writer and deposited either in the herbarium of the New England Botanical Club, Cambridge, Mass., or at the University of Pennsylvania, Philadelphia, Pa. Duplicates of a few have been distributed to the Missouri Botanical Garden, St. Louis, Mo., the herbarium of Cornell University, Ithaca, N. Y., or the Marine Biological Laboratory, Woods Hole, Mass.

ALISMA PLANTAGO-AQUATICA L., var. PARVIFLORUM (Pursh) Farwell. See Rept. Comm. Parks & Boulev., Detroit, xi. 44 (1900). This is apparently a rare plant in southeastern Massachusetts. Material in the herbarium of the New England Botanical Club shows it from New Bedford, Bristol County, where it was collected by E. W. Hervey, but it appears to be unknown elsewhere in this part of the state. In 1924 the writer came upon the plant growing in a springy hollow in the woods east of the Eel Pond at Woods Hole.

[1] Svenson, RHODORA, XXX. 135 (1928).

This material had small fruiting heads (3–4 mm. in diam.) and small achenes (less than 2 mm. long) and seems best referred to the variety *parviflorum* as at present understood.

ELODEA OCCIDENTALIS (Pursh) St. John. See Rhodora, xxii. 17 (1920). This is not a common plant on Cape Cod, having been collected previously only from Harwich and Brewster. It is abundant in Fresh Pond, Falmouth, where it has been observed in late summer piled up in windrows along the cobbly border of the pond.

PANICUM LATIFOLIUM L. A species characteristic of the somewhat better soils of the central and western portions of the state and here for the first time reported from Barnstable County. Specimens in the Gray Herbarium and New England Botanical Club show it to be occasional in Plymouth and Bristol Counties but it seems not to have been found before on Cape Cod. It was collected by Professor Fernald and the writer in the rocky woods west of Falmouth, a region which harbors several other of these representatives of a more continental flora.

GLYCERIA ACUTIFLORA Torr. This grass seems never before to have been reported from Barnstable County. It has been collected on Nantucket and Martha's Vineyard and the writer has long been familiar with it on the Elizabeth Islands where it is abundant in many of the small pond holes. It is now recorded from Falmouth, where it is known to occur in several boggy hollows west of the railroad station.

G. GRANDIS Wats. Another grass which enjoys, in general, a more northerly distribution. It has been collected at Brewster and is also known on the basis of a specimen of A. H. Moore's from Woods Hole. The present station is a moist grassy hollow in the woods north of Woods Hole, where this grass and *Carex tribuloides* form an almost solid growth.

CYPERUS FERAX Rich. Not a common sedge in this portion of the state. It seems to prefer brackish meadows and, although such situations abound in Barnstable County, this species appears to have been collected at only one locality. Some years ago Professor Fernald discovered it growing along the brackish shores north of Gunning Point, Falmouth, and on August 9, 1927, he and the writer visited the same station and again found the plant, in company with *Hierochole odorata*, var. *fragrans*, *Rumex maritimus*, var. *fueginus* and *Galium trifidum*.

SCIRPUS DEBILIS Pursh. This species is fairly common in eastern Massachusetts, where it is known from many stations in Middlesex and Norfolk Counties. Its only recorded occurrence in the extreme southeastern portion, however, seems to have been from Martha's Vineyard where we know it from Tisbury on the basis of collections made by Cushman and by Seymour. It is here reported from Weeks Pond in Falmouth, at present its sole locality in Barnstable County.

CAREX TRIBULOIDES Wahlenb. Collected in a wet, grassy hollow north of Woods Hole, with *Glyceria grandis*, as noted above. This is another sedge of the better soils inland and therefore rare or lacking on the sands and gravels of southeastern Massachusetts. In the New England Botanical Club there is a specimen of Hervey's collecting from New Bedford, but otherwise the plant is unknown in the state south of Norfolk County.

SPIRODELA POLYRHIZA (L.) Schleid. The only record of this species from the southeastern part of the state in either the Gray Herbarium or the New England Botanical Club is a collection made at Lakeville, Plymouth County. However, in the herbarium of the Boston Society of Natural History there is a sheet collected by Cushman in 1912 labelled merely "Falmouth." The plant has long been known to the writer as growing rather abundantly in Oyster Pond, which lies about halfway between Woods Hole and Falmouth. There is evidence that this pond suffers occasional inundations from the waters of Vineyard Sound, an observation which is borne out by the occurrence around its shores of tangled filaments of the green alga *Enteromorpha* as well as the presence of *Potamogeton bupleuroides*, a frequent indicator of brackish conditions.

JUNCUS BALTICUS Willd., var. LITTORALIS Engelm. This interesting rush, which ranges from Labrador and Newfoundland south to Lancaster County, Pennsylvania, and westward across the continent to the Rocky Mountains, is known in Massachusetts only from the eastern portion of the state. On Cape Cod it has been collected only at Provincetown, Barnstable and Sandwich and it therefore seems permissible to report it from a fourth station in Barnstable County. The plant forms an almost solid growth around the north side of a small pond west of Oyster Pond, associated with *Scirpus Olneyi*.

J. BREVICAUDATUS (Engelm.) Fernald. A species which is far from common in southeastern Massachusetts. Its only other station in Barnstable County seems to be at Brewster. We now know it

from a quagmire bog east of Long Pond, Falmouth, where it was collected by the writer in mature fruiting condition on August 21, 1928.

RUMEX MARITIMUS L., var. FUEGINUS (Phil.) Dusén. See St. John, RHODORA, xvii. 73 (1915). This species has been collected on Nantucket, Martha's Vineyard and the Elizabeth Islands, but the only indication of its occurrence in Barnstable County has been a specimen in the herbarium at Yale University collected by W. G. Farlow and labelled "Falmouth." As already noted, Professor Fernald and the writer came upon the plant in brackish marshes north of Gunning Point, Falmouth.

CERATOPHYLLUM DEMERSUM L. A search through the material in the Gray Herbarium fails to show this plant from southeastern Massachusetts, but in the collections of the New England Botanical Club there are specimens from New Bedford, Chatham and Eastham. In Oyster Pond (the same locality from which *Spirodela* is noted above) this species has for several consecutive seasons been observed by the writer. Contrary to the usual custom of the species, the Oyster Pond material has occasionally been found in a fruiting condition.

ANEMONE VIRGINIANA L. This plant is of only occasional occurrence in southeastern Massachusetts, enjoying rather an Alleghenian distribution. Material in the Gray Herbarium and the New England Botanical Club demonstrates its presence at Barnstable and Centreville and in the collections of the Boston Society of Natural History there are two sheets from Woods Hole. It was discovered by Professor Fernald and the writer growing in the sandy woods near Gunning Point, Falmouth.

THALICTRUM REVOLUTUM DC. Like the preceding, this species belongs rather to the upland wooded areas than to the lighter soils of the Cape Cod region. It has previously been collected at Sandwich and Centreville and is now reported from Falmouth, where it has been found at several localities in the rocky woods north of Woods Hole.

AKEBIA QUINATA Dcne. An ornamental climber, belonging to the Lardizabalaceae, which occurs occasionally as an escape. The only other New England record for this plant, as shown by material in the Gray Herbarium, is from Sandwich, where it was collected by Professor Fernald in 1922. It has been known to the writer since 1923,

when it was first discovered trailing over the stonework of a bridge along the railroad a short distance northeast of Woods Hole.

ADLUMIA FUNGOSA (L.) Greene. Sparingly escaped from cultivation in New England and here reported, apparently for the first time from southeastern Massachusetts, from an open field northeast of the village of Falmouth.

RADICULA SYLVESTRIS (L.) Druce. Records for this plant from Cape Cod seem to be totally lacking. In fact, the writer has seen no material to indicate that it occurs in Massachusetts southeast of Norfolk County. It is here reported from Woods Hole, where it was found growing along a road running through the oak woods north of the Laboratory.

RUBUS ALLEGHENIENSIS Porter. Although this species has twice been collected on Martha's Vineyard, there have been no previous records to account for its occurrence elsewhere southeast of Plymouth and Bristol Counties. It is another of those plants the geographical relations of which are much more with a continental than a coastal plain flora, and yet which recent researches have shown to belong to the vegetation of the western portion of the Cape. It occurs in the sandy woods north of Woods Hole and west of Falmouth.

BAPTISIA BRACTEATA (Muhl.) Ell. The discovery of this interesting plant in the Falmouth region was first reported by Dr. W. R. Taylor in 1921.[1] It was found growing in the dry, sandy soil along the railroad about one mile northeast of Woods Hole in company with *B. tinctoria* and many other species of the dry pine and oak woods. That its occurrence here is due to the proximity of the railroad seems obvious, for the species is a southern and western one, the present locality constituting its only known station north of South Carolina or east of Indiana. The colony, a small one when first reported, appears to have increased in size during recent years and, if not further molested by those who seek to transplant this attractive species to their own gardens, seems destined to persist.

CELASTRUS SCANDENS L. The Climbing Bittersweet is certainly not a common plant in southeastern Massachusetts. It was collected by Professor Fernald from Falmouth in 1919 and has twice been found at Chilmark, Martha's Vineyard. These stations, with the addition of that here reported, appear to represent the known distribution of this species in the state south of Norfolk County. The

[1] **Rhodora, xxii. 255 (1921).**

present locality is a deep hollow in the woods just north of Woods Hole, where the plant forms a dense tangle over the vegetation bordering a small pond.

Malva Alcea L. This handsome species, which occurs occasionally as an escape from cultivation, is well established along the upper border of the beach near the lighthouse at Nobska Point, east of Woods Hole.

Lythrum Salicaria L. The Spiked Loosestrife has been collected from half a dozen localities in Massachusetts, most of them in the central and western portions of the state. It is here recorded from Falmouth, where it has become established along the grassy eastern border of Salt Pond.

Coelopleurum lucidum (L.) Fernald. *C. actaeifolium* of Gray's Manual. See Rhodora, xxi. 146 (1919). This essentially northern species has been known in southeastern Massachusetts from two localities, to which may now be added a third and a fourth. The plant was reported[1] in 1840 from Scituate, Plymouth County, and Fernald and Weatherby found it at Falmouth. To the writer it has long been known as growing rather abundantly along the exposed gravelly shores north of Woods Hole, a section known locally as Ganset. It has also been collected from Cuttyhunk, one of the Elizabeth Islands (Dukes County).

Thymus Serpyllum L. Creeping Thyme has been introduced on the golf course at Woods Hole and has become established on nearby roadside banks. This appears to be the first record of the plant from Barnstable County.

Penstemon laevigatus Ait., var. digitalis (Sweet) Gray. This species, here reported for the first time from southeastern Massachusetts, was collected along the railroad northeast of Woods Hole, growing not far from the *Baptisia bracteata*. Like the *Baptisia*, it presumably owes its occurrence there to the presence of the railroad.

Viburnum acerifolium L. This is another of those plants characteristic of the better soils inland and only sparingly, if at all, represented on Cape Cod. It is known from the Sandwich and Falmouth regions, being of fairly frequent occurrence in the woods around Woods Hole.

Sicyos angulatus L. There is no material in either the Gray Herbarium or the collection of the New England Botanical Club to

[1] Bigelow, Fl. Bost. ed. 3: 118 (1840).

indicate that the One-seeded Bur Cucumber has ever been found growing in Barnstable County. This may, however, be merely another case of a common plant consistently neglected by collectors. The species grows profusely in a wet thicket north of the Mill Pond at Woods Hole.

HIERACIUM PILOSELLA L. This little Hawkweed, which is such an obnoxious pest in certain regions northward, is fortunately of only casual occurrence in Massachusetts. In Barnstable County it has been collected previously only at Centreville. The present station is a grassy bank along the roadside near Oyster Pond, about two miles northeast of Woods Hole. Observations covering a period of five years show that the plant is not spreading and lead to the conclusion that it is here unlikely to become a dangerous weed.

UNIVERSITY OF PENNSYLVANIA.

A NEW LESQUERELLA FROM WESTERN TEXAS.—LESQUERELLA **lepidota**, sp. nov. Perennial or biennial from a rather slender, woody root; stems slender, clustered, ascending, 4–10 cm. high, sparsely leafy, densely lepidote-stellate; basal leaves oblanceolate, obtuse, up to 7 cm. long and 13 mm. wide, long-petioled, entire or frequently repand, lepidote-stellate on both surfaces; cauline leaves up to 2 cm. long and 5 mm. wide, entire, obtuse, narrowed into a slender petiole, lepidote-stellate on both surfaces; racemes up to 3 cm. long, many-flowered, dense; pedicels about 10 mm. long, ascending, stout; petals bright yellow, obovate, clawed, 6 or 7 mm. long; sepals oblong, 4 mm. long, densely lepidote-stellate; capsules longer than broad, 6 or 7 mm. long and 5 mm. broad, rounded at the summit, lepidote-stellate, shortly stipitate; style much shorter than the capsule, slender, up to 3 mm. long; seeds 5–12 in each capsule, flattened, orbicular, about 1.5 mm. in diameter.

Collections were made May 28, 1928, in the Sierra Diablo on a ridge just above Victoria Canyon at about twenty miles north of Allamore, Hudspeth County, TEXAS. The TYPE specimen, No. 1588, is deposited in the herbarium of the Texas Agricultural College at College Station, Texas. Co-type specimen, No. 1587, is deposited in the Gray Herbarium.

This species differs from *L. montana* (Gray) Watson in having the capsule rounded at the apex and likewise in having the cauline leaves rounded at the apex. It differs from both *L. lata* Wooton & Standley and *L. rectipes* Wooton & Standley in having a much longer capsule and a style not surpassing the capsule. This species is clearly distinct.—V. L. CORY, *Grazing Research Botanist*, TEXAS AGRICULTURAL EXPERIMENT STATION.

A NEW SPECIES OF SALIX FROM THE MACKENZIE BASIN[1]

Hugh M. Raup

(Plate 202)

While botanizing in the upland country west of the Slave River during the summer of 1929, the writer turned up a strange willow. The material was collected rather late in the season, when nearly all the capsules had opened. It grows in a marshy bog, with a thick turf of grasses, sedges, and such other willows as *S. candida* Flügge. Its nearest relative seems to be *S. pedicellaris* Pursh, from which it differs chiefly in its pubescent capsules and twigs, and in its shorter pedicels. It is clearly different, also, from an eastern segregate from *S. pedicellaris*, *S. hebecarpa* Fernald, having narrower, more acute, and more pubescent leaves with non-reticulate venation, hairy branches, and an upright habit. *S. hebecarpa* has pubescent capsules as a variable character.

Salix **athabascensis**, nov. sp. (tab. 202). Frutex 3–6 dm. altus; ramuli novelli subtiliter cinereo-pilosi; folia obovata vel elliptica, 10–30 mm. longa, 5–15 mm. lata, integerrima vel minute glanduloso-denticulata, apice acuta vel acuminata, superne tenuiter sericeo-pubescentia, adulta praeter costam glabrescentia, subtus tenuiter adpresse pilosa vel adulta glabrescentia; petioli 2.5–6 mm. longi, plerumque 3–4 mm. Amenta feminea 1.5–2 cm. longa, pedunculo foliato 1–1.5 cm. longo suffulta; bracteae fulvae adultae, 1–1.3 mm. longae, obtusae vel rotundatae, sericeo-villosae; capsula 5–6 mm. longa, breviter adpresso-villosa, pedicello 1–1.5 mm. longo suffulta; glandula 0.3–0.4 mm. longa, truncata; styli 0.3 mm. longi, stigmatibus bifidis.

Shrub 3–6 dm. high; young branches finely gray-hairy; leaves obovate or elliptical, 10–30 mm. long, 5–15 mm. wide, entire or minutely glandular-dentate, acute or acuminate, the upper surfaces thinly silky-pubescent, becoming glabrous except on the midvein, the lower surfaces thinly appressed hairy or the adult becoming glabrous; petioles 2.5–6 mm. long, mostly 3–4 mm. Female aments 1.5–2 cm. long, born on leafy peduncles 1–1.5 cm. long; scales brown in the mature material, 1–1.3 mm. long, obtuse or rounded, silky-villous; capsules 5–6 mm. long, covered with short appressed hairs; pedicels 1–1.5 mm. long; gland 0.3–0.4 mm. long, truncate; style 0.3 mm. long, with a divided stigma.—Muskeg about 1 mile north of the ranger cabin at Moose Lake, lat. 59° 40′, Alberta, August 17, 1929. *H.*

[1] Published by permission of the Director, National Museum of Canada.

M. Raup. Nos. 8120, 8122, 8125–26, 8128–29. The TYPE, No. 8129, will be found in the herbarium of the National Museum of Canada.

GRAY HERBARIUM,
Harvard University.

EXPLANATION OF PLATE 202.

SALIX ATHABASCENSIS. Branches at right × ½; branch at left × 1¾.

A NEW WILLOW FROM THE CÔTE NORD, QUEBEC

M. L. FERNALD

(Plate 203)

SALIX **simulans**, n. sp., frutex 4.5 dm. altus erectus; ramulis novellis sparse pilosis glabratisve deinde castaneis nitidulis; gemmis bene evolutis ovoideis olivaceo-castaneis nitidis sparse pilosis; foliis maturis oblongis vel anguste oblongo-obovatis 1–3.3 cm. longis 0.4–1.4 cm. latis subcoriaceis glabris vel glabratis (junioribus sparse pilosis) obtusis vel subacutis basi obtusis vel angustatis petiolatis, petiolis gracilibus 3–8 mm. longis, margine integris vel subintegris vel obsolete dentatis revolutis, supra viridibus subtus glaucescentibus elevato-venosisque venis lateralibus basi breviter decurrentibus; amentis foemineis maturis coetaneis pedunculatis 1.5–2 cm. longis 6–8 mm. crassis densifloris vel basi laxifloris; pedunculis 1.5–2 cm. longis foliis 4–6 munitis, pedunculo rhachique griseo-pilosis; bracteis late oblongis 2–2.5 mm. longis basi longe pilosis apice fulvescente rotundato vel emarginato glabrescentibus; capsulis lanceolato-ovoideis apice obtusis 2.5–4 mm. longis densissime albido-tomentosis; stylis distinctis 0.3–0.5 mm. longis valde bifidis, stigmatibus apice valde bipartitis; pedicellis vix 1 mm. longis glandulam elongatam vix duplo superantibus.—QUEBEC: open swampy area, Betchewun, Saguenay County, August 26, 1928, September 3, 1929, *Harrison F. Lewis* (TYPE in Gray Herb.).

Salix simulans, referred to me by Dr. Lewis, when he had only the original collection of 1928, was so perplexing that I encouraged him to secure a second collection in 1929. In its very tomentose and short-pedicelled capsules it would seem to belong in the § *Glaucae*, its aments being very similar to those of the smallest extremes of *S. glauca* L. and of *S. cordifolia* Pursh. In foliage, however, *S. simulans* is as clearly a member of the § *Roseae*, the lower surfaces of the mature leaves often showing the decurrent bases of the elevated lateral nerves (decurrent along the side of the strong midrib) such as are often evident in many of the leaves of *S. myrtilloides* L. of Europe

and its American representatives, *S. pedicellaris* Pursh and *S. hebecarpa* Fernald. In fact, the habit and the foliage of *S. simulans* are so like those of *S. pedicellaris* and the more erect extremes of *S. hebecarpa* that specimens in foliage alone can be separated from them only by minutely pilose young twigs, plumper and pilose axillary buds and pilose young leaves. Although the name *S. hebecarpa* suggests that that species of Gaspé and western Newfoundland has pubescent capsules, it is unfortunately a misnomer. *S. hebecarpa* was originally published as *S. fuscescens*, var. *hebecarpa* and so named because the type material had some pubescence on the capsule, contrasted with the glabrous capsule of the Siberian and Alaskan *S. fuscescens*. The character proves to be not a significant one in *S. hebecarpa* since most specimens have the capsules glabrous or only sparsely pubescent. In *S. hebecarpa* the glabrous or only sparsely pubescent capsules are 6–8 mm. long; in *S. simulans* the densely white-tomentose capsules only 2.5–4 mm. long. From *S. pedicellaris* *S. simulans* is at once distinguished by the pubescent and very short-pedicelled capsules; those of *S. pedicellaris* being large, glabrous and on pedicels several times as long as the nectary.

S. simulans is, likewise, related to *S. athabascensis* Raup, published in this number, but that species has more permanently pubescent and opaque bark of the branches, a permanent pubescence on the leaves and very much larger capsules.

EXPLANATION OF PLATE 203.

SALIX SIMULANS, photographs from type collection: portion of fruiting branch × 1; upper insert, detail of venation, showing decurrent veins × 10; lower insert, capsules and stigmas × 5.

AN ALPINE STATION FOR HIERACIUM AURANTIACUM.—While collecting on Mount Washington during the summer of 1927 I found a cluster of several plants of *Hieracium aurantiacum* L., in blossom on the Lion Head Trail at an elevation of about 5500 feet. The highest station recorded by Pease[1] is 4200 feet on Mount Pleasant more than a thousand feet lower. The group was growing beside the trail in the shelter of a clump of *Abies balsamea* and seemed to be in a thriving condition.—STUART K. HARRIS, Boston University.

[1] Pease, A. S. The Vascular Flora of Coös County, New Hampshire, Proc. Boston Soc. Nat. Hist., Vol. 37, No. 3, p. 371. 1924.

TIPULARIA DISCOLOR IN DUKES COUNTY, MASSACHUSETTS

JOHN M. FOGG, JR.

IN the sixth edition of Gray's Manual (1889) the distribution of the Crane-fly Orchis, *Tipularia discolor* (Pursh) Nutt. (*T. unifolia* (Muhl.) BSP.) is given as "sandy woods, Vt. to N. J. and Fla., west to Mich.; very scarce."

The records which may have formed the basis for the inclusion of this species in the flora of Vermont or elsewhere in New England will be considered below; that they were subsequently discredited is evidenced by the fact that in the seventh edition of the Manual (1908) the plant is spoken of as "extending northw. to N. J.; reported but unverified from farther north."

Norman Taylor, in his "Flora of the Vicinity of New York,"[1] in addition to listing eight counties in New Jersey (five of them being from the extreme northern portion of the state) from which *Tipularia* has been reported, records its occurrence "near N. Y. City" and on Staten Island. These two latter localities, although not in New Jersey, still do not extend the range of the plant north of that state, but merely fit in with its distribution as understood in recent years.

Of greater interest is the record, likewise incorporated by Taylor, of the occurrence of this species at Greenport, Long Island, for this extends its known range significantly to the eastward. For our knowledge of the Greenport station we are indebted to Roy Latham, who also discovered the plant at Orient Point, Long Island, and has recently reported the finding of two colonies at Montauk Point, the easternmost extremity of the island.[2]

In view of the rather large number of species common to eastern Long Island and southeastern Massachusetts, it seemed natural to wonder, upon reading Latham's account of the Montauk locality, whether *Tipularia* might not reasonably be expected to belong in this category. The first intimation that such was actually the case came from a remark made by Professor Fernald to the writer to the effect that in the herbarium of the Boston Society of Natural History there was a specimen of this rare orchid collected on Martha's Vine-

[1] Memoirs New York Bot. Gard., v. 259 (1915).

[2] Latham, R. Torreya, xxvii. 51 (1927). True, the species there reported and discussed is *T. uniflora*, but this presumably refers to the plant under present consideration.

yard. A visit to the Boston Society, where, through the kindness of Mr. S. N. F. Sanford, the facilities of the botanical collections were made available, resulted in the discovery of two sheets in the *Tipularia* folder. Inasmuch as these have apparently escaped general notice a few words concerning each of them seem not to be amiss here.

One of the sheets bears a label which reads, "Dry woods on a declivity ½ mile N. of Luce's Tavern, Martha's Vineyard, Chilmark?" At the bottom of the sheet are pencilled the words, "Oakes coll." There is no further indication as to habitat, date or name of collector, although the abbreviation "coll." following Oakes's name may conceivably refer to "collector", rather than to "collection" as one would normally infer.

The other sheet carries a ticket with the inscription, "Herb. Oakes." as a heading. In addition to the name of the plant the only information given on this label is the locality "Martha's Vineyard," which is followed, in pencil, by the word "Chilmark." A printed slip affixed to the bottom of the sheet reads, "Herb. John A. Lowell."

It is entirely possible that these two specimens may represent the same collection or, at least, separate collections from the same locality. And just where that locality may have been is indeed a matter for conjecture. Speculation on this head is invited by the fact that the word "Chilmark" comes at the end of the legend on one of the labels, to be followed by a question mark, while on the other sheet it is written in with pencil, as though doubtfully correct. Was Luce's Tavern actually in Chilmark or was it in some other part of the island, as, for example, West Tisbury?

Unfortunately, the name of Luce is of such ubiquitous occurrence on the Vineyard that it is difficult, perhaps impossible, to answer this question, but there can be no doubt that the long line of wooded morainal hills extending from Menemsha northeast to West Chop offers many a habitat ideally suited to the requirements of this interesting orchid. Further, the contention that *Tipularia* was collected in some portion of Martha's Vineyard other than Chilmark is strengthened by the circumstance that Sydney Harris, whose intensive collecting from the Chilmark region covered a period of fourteen years (from 1891 to 1904) and whose many specimens from there represent important pioneer work in laying the foundations for such knowledge as we possess of the flora of the island, has left us no

record of the plant from an area with which we have every reason to suppose he was intimately familiar.

That *Tipularia* was well known to the earlier botanists from Martha's Vineyard becomes evident upon even a casual inspection of the literature. Oakes himself records the plant "In woods in Martha's Vineyard, Mass., 1829."[1] In Torrey's Flora of the State of New York we find the statement, "Its northern limit, so far as I know, is Martha's Vineyard, where (I believe) it was found by Mr. Oakes."[2] Similar references, augmented by reports of the species from elsewhere in Massachusetts and from Vermont, may be met with in local and state floras during the ensuing years and are summarized in 1884 by Baldwin, who tells us that *T. discolor* "straggles across the sandy woods of Massachusetts into Southern Vermont."[3]

In preparing the present note, which aims merely to emphasize the occurrence of *Tipularia* in Dukes County, no attempt has been made to verify records of the plant from elsewhere in New England. The significant feature of the two herbarium sheets described above is that they constitute vouchers, apparently overlooked by some recent workers, to confirm the occurrence of the Crane-fly Orchis in southeastern Massachusetts.

During the winter of 1927–28 the writer, while pursuing a program of work at the Gray Herbarium, found in the library of that institution a typewritten list of the plants of Nashawena Island compiled by Mrs. Alice R. Northrop. In 1901, and again in 1903, Mrs. Northrop had visited Nashawena, which is one of the Elizabeth Islands in Dukes County, Massachusetts, and the list in question, which so far as is known has never been published, embodies the results of her own observations and contains the names of over three hundred ferns and flowering plants found by her on that island. Interestingly enough, *Tipularia discolor* (*unifolia*) is included in the flora of Nashawena by Mrs. Northrop, with the comment, "quite common in 3 or 4 localities, c. & n. e. part island."

Inasmuch as this list includes the names of several other species remarkable for their occurrence in southeastern New England, the writer at once set about ascertaining whether these records were corroborated by herbarium specimens. It was soon learned that

[1] Wm. Oakes, in Hovey's Mag. vii. 184 (1841).
[2] Torrey, Fl. N. Y. ii. 272 (1843).
[3] Baldwin, Orchids of New England, 90 (1884).

Mrs. Northrop had done a certain amount of collecting and that her specimens had been presented to the New York Botanical Garden. A systematic search through the collections at New York revealed the fact that about one-fifth of the species reported in the "List of Nashawena Plants" are substantiated by herbarium sheets.[1] Fortunately, among this twenty per cent is an excellent specimen of *T. discolor* collected in the summer of 1901. The label bears no information as to the exact location on Nashawena where the plant was found, but the island is not a large one and it is to be expected that future investigations will lead to a discovery of the haunts of this rare orchid.

Here then, is a second station in Dukes County, Massachusetts for a species which may now definitely be restored to the flora of New England. And it is not totally without interest that both of these localities should be from areas which display an affinity with a continental flora rather than with that transplanted element of the flora of the southern coastal plain so characteristic of nearby portions of Barnstable, Dukes and Nantucket Counties.

University of Pennsylvania.

Deam's Grasses of Indiana.[2]—No one else is anywhere nearly so well qualified as Mr. Deam to write of the flora of Indiana; it is therefore in the natural course of things (though none the less praiseworthy for that) that his latest publication, a manual of the grasses of the state, is admirably comprehensive and thorough. From the introductory account of the morphology of the grass plant, by Dr. Paul Weatherwax, to the illustrated glossary at the end, no feature is lacking which such a work should have. There are carefully worked out keys; nearly every species has an original, detailed description drawn up from Indiana material; and at least a spikelet of every one is illustrated. The drawings—with one exception, by Dr. Weatherwax—are painstaking and essentially accurate throughout. Perhaps, in some cases, they are a bit conventionalized in the rendering of certain details—witness the difference in the pubescence of the spikelet as drawn in plate 75 and in Mrs. Chase's exquisitely finished little figure of the same thing on the following page.[3]

[1] A detailed account of the results of this research is incorporated in an extended survey of the Flora of the Elizabeth Islands soon to appear in Rhodora.

[2] Deam, Charles C. Grasses of Indiana. Indiana Dept. of Conservation, Pub. 82. 256 pp., 86 pls., numerous maps and text figures. Indianapolis, Oct. 15, 1929.

[3] One is conscious of a wistful desire that the difference in shape shown in the plates between the first glume of *Panicum huachucae* and *P. tennesseense* and of other members of their group were constant; but sad experience (as well as Hitchcock & Chase's lack of emphasis on this character) teaches that it is not.

The nomenclature follows the International Rules, with one or two of the small slips which none of us wholly escape in this technical matter. Under the Rules, *Muhlenbergia umbrosa* Scribn. and *Panicum stipitatum* Nash are superfluous names; *M. sylvatica* Torr. and *P. elongatum* Pursh may be, and should be, used.[1] Modest as always, Mr. Deam makes no attempt at taxonomic originality; here, he follows for the most part Hitchcock and Chase, but is prompt in taking into account all work bearing on his region. Originality in plenty, and of the best kind, may be found elsewhere—for instance in the full notes on the habitat, associates, etc. of each species, drawn from Mr. Deam's rich knowledge of the local flora and his years of experience in the field. These are of more than local interest; so, too, is the one new species described, *Panicum Deamii* Hitchc. & Chase. A near relative of the Atlantic *P. Commonsianum*, it adds one more to the list of plants of coastal plain affinity found about the southern end of Lake Michigan. And the maps of distribution within Indiana which accompany each species call for more than passing mention. They are made large enough to admit of placing in each county, not the usual dots or crosses, but one or more letters, indicating not only occurrence, but also the herbaria where the specimens are to be found on which the records for the county are based. It is hard to imagine a more exact, succinct, and comprehensive method of conveying phytogeographical information.

Altogether, "Grasses of Indiana" is a model of its kind; it should take its place on the little shelf of classical local floras to which one turns with confidence for exact data as to the regions covered.—C. A. WEATHERBY.

[1] *Agrostis sylvatica* Torr. is validated (or, as Mr. Sprague would say, legitimatized) by transfer to *Muhlenbergia;* for *Panicum elongatum* see Rhodora xxxi. 108 (1929).

Volume 32, no. 377, including pages 99 to 102 and plates 199 to 201, was issued 7 May, 1930.

Photo. by H. M. Raup.

SALIX ATHABASCENSIS

(Branch at right × ½, at left × 1¾)

Photo. by H. M. Raup.

SALIX SIMULANS

(Branch × 1, Venation × 10, Capsules × 5)

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THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

John M. Fogg, Jr.

Part I. General Discussion

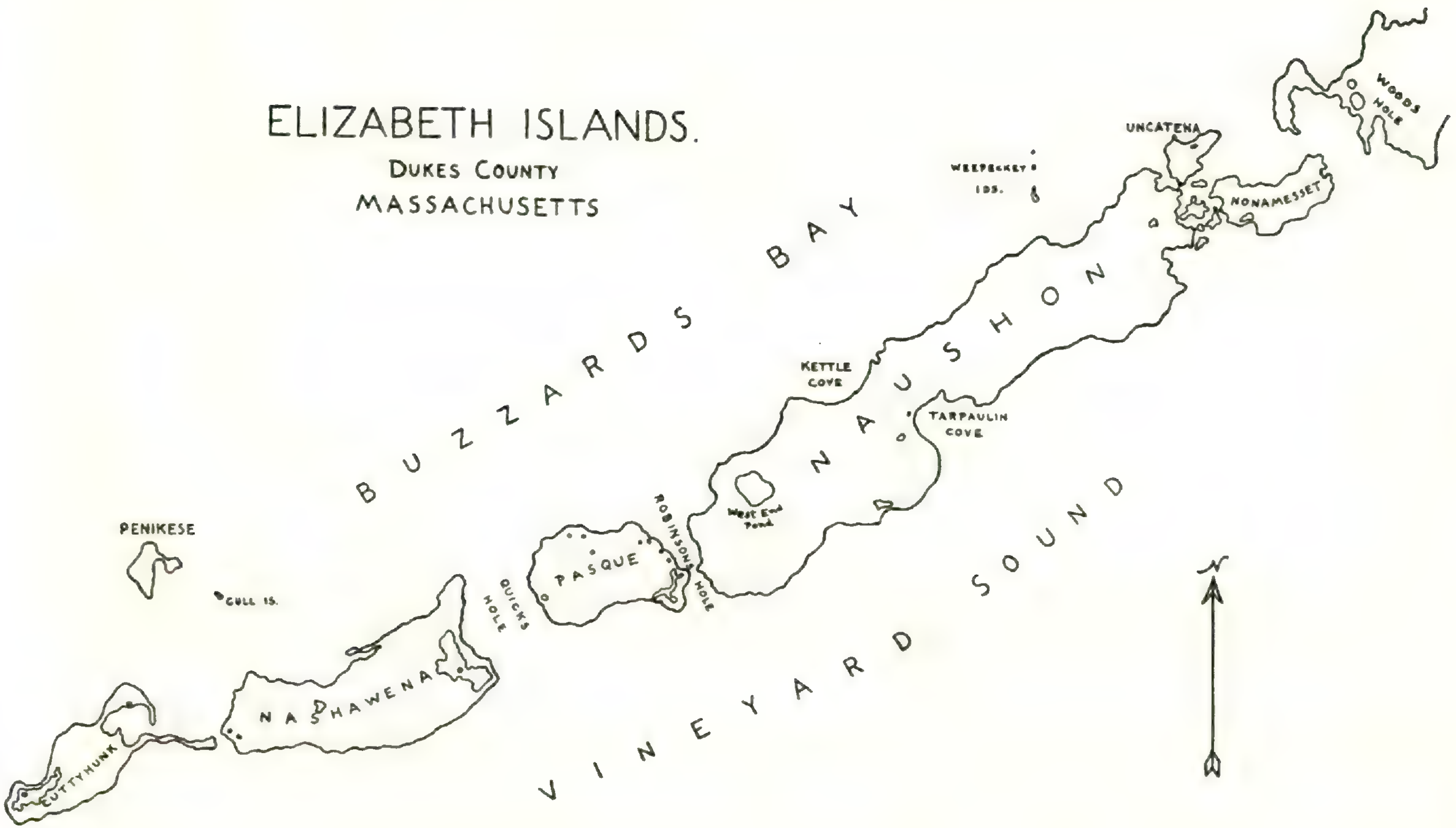
LOCATION

The Elizabeth Islands are formed by a partly submerged ridge of morainal hills which extends WSW from Woods Hole, Massachusetts, for a distance of about 16 miles. This ridge has been separated from the mainland, as well as divided into islands, in comparatively recent geological time. To the northwest this chain of islands is washed by the waters of Buzzards Bay, while along their southeastern and southern shores runs Vineyard Sound, a channel 4 miles wide which flows between the Elizabeth Islands and Martha's Vineyard. Together, the Elizabeths and Martha's Vineyard constitute Dukes County, the former being included in Gosnold Township.

Seven main islands and twelve smaller ones make up the Elizabeth Islands. Starting at their eastern end the seven principal divisions are, in order: Nonamesset, Uncatena, Naushon, Pasque, Nashawena, Cuttyhunk and Penikese. All of these lie in a more or less direct line with the exception of Penikese, which is separated from the main axis of the chain, being just one mile due north of Cuttyhunk. Between Nonamesset and Naushon lie Monohansett and Buck Islands, separated by narrow channels or "gutters" which have been bridged. To the north, and lying in Hadley Harbor, are Captain's and Ram's Head Islands, the latter appearing on some maps as

ELIZABETH ISLANDS.

DUKES COUNTY
MASSACHUSETTS



Puritan Island. To the south of the gutters lie East Buck and West Buck Islands, although here again confusion exists, as West Buck occasionally appears on maps as "Monohansett." The three Weepecket Islands extend northward from the eastern end of Naushon and now constitute a bird sanctuary. With the mention of Gull Island, a small strip of sand lying east of Penikese, and Pine Island, immediately to the northeast of Nonamesset, the subject of the minor islands may be dismissed, for the remaining islets are too small to have received formal names.

HISTORICAL INTEREST OF THE ELIZABETH ISLANDS

A unique historical interest attaches to the Elizabeth Islands through the fact that upon the outermost of the chain was made the first attempt to establish an English settlement in North America. On the 4th of June (Old Style, May 25th), 1602, Captain Bartholomew Gosnold, after having named Cape Cod and Dover Cliff (now Gay Head), fixed upon the island of Cuttyhunk as the site of a future settlement and, in honor of his sovereign queen, called it Elizabeth's Isle, which name has since been applied to the entire group. Here, upon a tiny islet in a large pond at the west end, the crew of Gosnold's ship, the "Concord," constructed a rude fort, and here they lived for a period of three weeks. This settlement, short-lived though it was, thus antedates the founding of Jamestown by five years and that of Plymouth by eighteen years, a fact which was commemorated by the erection and dedication of a monument to Gosnold on Cuttyhunk upon the occasion of the tercentenary of the original landfall.[1]

Cuttyhunk is the only member of the Elizabeth Islands which has been able to boast a permanent population. The little town of Gosnold, named after its illustrious founder, has long existed as a fishing village at the east end of the island and today has about one hundred inhabitants. During the whaling days schooners bound for New Bedford were accustomed to stop at Cuttyhunk to pick up their pilots.

Another claim to fame on the part of one of the Elizabeth Islands may be made for Penikese, the smallest and most desolate member of the chain. Here, in the summer of 1873, Louis Agassiz founded his school which, through the generosity of the New York merchant who

[1] For further details concerning the history of Gosnold on Cuttyhunk and the exercises which marked the dedication of the monument in 1903, see the Old Dartmouth Historical Sketches, nos. 1 and 4. New Bedford, Mass. (1903).

donated the island and funds for the construction of a laboratory, became known as the Anderson School of Natural History. To this summer school, the first of its kind in the country, came students from all over the United States and the roll included names which later became known as belonging to some of the foremost figures in American biology. Following Agassiz's death in December, 1873, the school was continued for one summer by his son Alexander, but thereafter was abandoned and the island reverted to the State of Massachusetts, later to be used as a leper colony, from which function it was released only in 1921.

The island of Naushon has for several generations been the property of the Forbes family, various members of which have summer homes at the east end, near Hadley Harbor. To the Forbeses also belong Nonamesset, Uncatena and Nashawena and it is only through the generosity and hospitality of the owners that it has been possible to carry on the botanical exploration which forms the basis for the present survey.

PREVIOUS BOTANICAL WORK ON THE ELIZABETH ISLANDS

Mention has been made above of Gosnold's visit to the Elizabeth Islands in 1602. With Gosnold on that expedition were Gilbert Archer and John Brereton, "gentlemen and historians." The former has left us a very readable and illuminating account of the voyage.

One of the chief objects which Gosnold had in visiting the New World was to collect and carry home to England a cargo of native Sassafras which was then much in demand because of its supposed medicinal value. According to Archer, Elizabeth's Isle (Cuttyhunk) was in 1602 overgrown with wood, a fact not without interest in view of the present treeless nature of this and of several other islands of the chain. Not only did Gosnold's party find there the Sassafras which they sought, but mention is also made of cedar, oak, beech and ash. The very islet upon which the fort was built is spoken of as cedar-covered. Hills Hope (Penikese) was likewise overgrown with cedar, and Naushon which was also visited is referred to as being forested, a character which this island, almost alone of the Elizabeths, has retained in large measure down to the present day.

References to the plant life of the Elizabeth Islands seem to be lacking for a period of more than 250 years, but we may well suppose that during that interval extensive deforestation was carried on and

the islands divested of their original tree growth. Certain it is that within the memory of no living inhabitant have there been trees on Cuttyhunk or Penikese, except the few which have been planted by the hand of man. It is probable that this statement also holds for Pasque and the greater part of Nonamesset and Uncatena. Nashawena still has considerable areas which are more or less wooded, and Naushon, as already mentioned, has apparently retained much of its original forest.

The first published report, known to the writer, on the flora of any of the Elizabeth Islands dates from the year 1874 and concerns the island of Penikese. Among the students attracted to Agassiz's laboratory in the summer of 1873 was David Starr Jordan, who began his scientific career with a botanical publication. The task assigned to Jordan by Agassiz was an enumeration of the plants growing upon the island and in the waters surrounding it. As the result of this study Jordan published a list[1] of the flora in which he included not only flowering plants but cryptogams as well. So far as the lower forms were concerned, since no attempt was made at microscopic examination, only the most obvious species were included. The list enumerates 83 species of algae, 2 mosses, 1 fern and 113 species of flowering plants. Although the marine algae were preserved and the original set is still in existence, the writer has it on the authority of Dr. Jordan that no collection of specimens of the higher plants was made, and we have therefore only the published names as records. In 1923, on the occasion of the fiftieth anniversary of the founding of the Anderson School, a botanical survey of Penikese was made by the staff and students of the Marine Biological Laboratory at Woods Hole, Massachusetts. The results of this survey were published in RHODORA for 1924, and, insofar as they indicate the possible direction of change in the elements of the flora of one of the Elizabeth Islands, will be referred to later.

Since 1873 nearly a score of botanists have visited the Elizabeth Islands and brought back specimens which are in one or more of our eastern herbaria. Since these records have been incorporated into the catalog which forms the second part of this study, a brief chronological account of these collectors is here presented.

Walter and C. E. Faxon, in 1873 and 1875 respectively, collected a few specimens on Nashawena; these sheets are in the Gray Herbarium.

[1] Jordan, D. S. "The Flora of Penikese." Am. Nat. viii. 193 (1874).

In 1890 a Miss Weir collected on Naushon a few sheets which are now in the herbarium of the New England Botanical Club.

In August, 1898, Dr. Arthur Hollick made a trip to the islands with a view to studying the geological formations there presented. In the published account of this survey[1] the author makes mention of some of the plants which he found growing on the various members of the chain. The few specimens which he collected are in the New York Botanical Garden herbarium.

In the herbarium of the Marine Biological Laboratory at Woods Hole are several plants collected on Naushon in 1901. Some of these bear the name of S. B. Sipe while the others are merely signed "E. A. S." Inquiry has shown that these initials refer to Miss Elizabeth A. Simons (now Mrs. Eldred Jungerich).

Also from 1901 there dates the largest collection made on any of the Elizabeths, previous to that which forms the basis of the present report. In the Library of the Gray Herbarium there is a manuscript list compiled by Mrs. Alice R. Northrop of the plants of Nashawena. This list contains the names of 335 species of flowering plants and ferns and therefore constitutes a substantial contribution to our knowledge of the flora of this island. Mrs. Northrop spent the summer of 1901 and a part of that of 1903 on Nashawena and was thus admirably situated for making careful botanical observations. Her list includes many surprises: species which are either absent or very locally known from southeastern Massachusetts, some of them constituting, indeed, notable extensions in range. To this class of rarities belong such plants as *Cyperus erythrorhizos*, *Uvularia perfoliata*, *Habenaria bracteata*, *Arethusa bulbosa*, *Rumex verticillatus*, *Coptis groenlandica*, *Ranunculus reptans* and *Hydrocotyle Canbyi*. Unfortunately not a single one of these specialties appears to be corroborated by herbarium material. However, Mrs. Northrop did collect some specimens for permanent record, about one-fifth of the names on her list being represented by sheets in the collections of the New York Botanical Garden. And the fact that a few of her most interesting records, such as *Habenaria blephariglottis*, *Liparis* (*Leptorchis*) *Loeselii*, *Tipularia discolor* and *Asclepias verticillata* are substantiated by specimens and that others, such as *Arisaema triphyllum*, *Medeola virginiana*, *Ranunculus delphinifolius*, *Myriophyllum pinnatum*,

[1] Hollick, A. A Reconnaissance of the Elizabeth Islands. Cont. Geol. Dept. Columbia Univ. xi. no. 72 (1901).

Hydrocotyle Canbyi, *Cornus florida* and *Trientalis borealis*, have been duplicated by the writer either for Nashawena or other islands of the group, makes it necessary to give definite weight to the plants mentioned on Mrs. Northrop's list.

In the herbarium of the New England Botanical Club is a sheet of *Habenaria orbiculata* collected on Naushon by Lillian MacRae in July, 1904. This is the only specimen bearing the name of this collector seen by the writer.

A. H. Moore also visited the Elizabeth Islands in 1904 and several sheets of his collecting from Naushon and Penikese are in the collections of the New England Botanical Club.

In 1906, J. A. Cushman paid two visits to the islands, collecting on Nonamesset on July 27, and on Naushon, in company with Max Morse, on August 25. Specimens from these trips are in the herbarium of the Boston Society of Natural History.

Naushon and Nashawena were visited by E. F. Williams on July 10, 1911. The few plants collected on this occasion are in the New England Botanical Club herbarium.

In 1911, also, F. W. Pennell made several collecting trips to the Elizabeths, touching chiefly Nonamesset, Naushon, Nashawena and Cuttyhunk. Dr. Pennell's specimens, numbering about fifty, were distributed to the Marine Biological Laboratory and the University of Pennsylvania.

Thirty sheets from Cuttyhunk, collected by S. N. F. Sanford in 1917, are now in the New England Botanical Club.

Scattered collections were made on various islands by W. R. Taylor from 1917 to 1921. These specimens, with the exception of a sheet of *Liparis Loeselii* which is now in the New England Club, are either at the Marine Biological Laboratory or at the University of Pennsylvania.

Dr. H. K. Svenson visited Pasque on September 8, 1926 and collected a few specimens which are now in the herbarium of the New England Botanical Club.

On August 10, 1927, Professor M. L. Fernald and the writer visited Uncatena and Naushon, and the material collected upon that occasion has been distributed to the New England Botanical Club and the University of Pennsylvania.

A few specimens were collected by E. W Hervey on Cuttyhunk. These bear no date and are now in the New England Botanical Club herbarium.

COLLECTIONS MADE DURING COURSE OF PRESENT STUDY

By far the largest number of records accumulated to form the basis for the present account of the flora of the Elizabeth Islands represent collections made by the writer over a period of six years. From 1923 to 1928 inclusive, each island was visited many times and hundreds of specimens were collected. This material has been worked over and specimens have been distributed to the following institutions: Gray Herbarium, New England Botanical Club, University of Pennsylvania, Missouri Botanical Garden, Cornell University and Marine Biological Laboratory, Woods Hole, Massachusetts.

In the Fiftieth Anniversary Survey of Penikese already referred to,[1] the writer contributed the list of Spermatophytes collected in 1923. Subsequent visits have resulted in several additions to that list and made possible a more careful analysis of conditions on the island, and, as stated earlier, such evidences of vegetational changes as are thus afforded will be dealt with in a later section.

TOPOGRAPHY OF THE ELIZABETH ISLANDS

The general topography of the Elizabeth Islands is that of gently undulating morainal hills with a maximum elevation of about 170 feet. All the features characteristic of typical morainal regions are here presented, from the rounded hills and depressions, the latter often occupied by ponds or peaty bogs, to the boulders, some the size of a small house, which are scattered everywhere. Nowhere except along the beaches is there any considerable stretch of flat land: a walk across any of the islands necessitates repeated ascent and descent of the rolling hills.

Along the south sides of the islands, facing Vineyard Sound, the shore tends to be steep and precipitous, often presenting sheer sand and gravel faces nearly a hundred feet high, rising abruptly from a narrow cobble beach. In general the highest land is along this south shore, and the ground slopes away gradually to the opposite side of the islands where there are frequent coves and low brackish swamps or fresh ponds.

The ponds which occur in the hollows in the open, rounded hills are, in some cases, merely small pools which may form desiccated bog-holes or disappear entirely in very dry seasons, or, in other cases, are

[1] The Flora of Penikese, Fifty Years After. Edited by I. F. Lewis. RHODORA, xxvi. 181–195, 211–219, 222–229 (1924).

sufficiently large to have been designated as lakes. The largest of these latter, West End Pond on Naushon, is more than a quarter of a mile in diameter.

The character of the beaches varies from those of the rugged boulder type, liberally bestrewn with huge rounded stones, to those which offer a smooth sandy shelf. The characteristic type lies between these extremes, and we find for the most part a shingle or cobble beach with here and there piles of boulders and flat sandy patches. Dunes of shifting sand are rare and occur extensively only at the east end of Nashawena, and along the north shore of Naushon, west of Kettle Cove.

In those islands which have been deprived of their trees the open barren hills are covered with grasses, or other low growth, while the dry hollows or protected lee slopes harbor dense patches of scrub vegetation, made up mostly of *Myrica caroliniensis* and species of *Gaylussacia* or *Vaccinium*. Occasionally an extensive boggy hollow will be densely wooded, the tops of the trees (*Nyssa sylvatica, Quercus velutina, Acer rubrum*, etc.) conforming to the height and contour of the surrounding slopes.

The most conspicuous vegetational feature of the islands, aside from the open grassy downs, is the dense growth of rather low beech woods which clothes the greater part of Naushon and smaller areas on some of the other islands. From a distance these woods are seen to fit in closely with the general topography, due, doubtless, to the high wind velocity which would tend to level forest growth to the existing lines of the hills and ridges.

CHARACTERISTIC FEATURES OF THE SEPARATE ISLANDS

As the various members of the Elizabeth Islands exhibit some diversity as regards general topographic and vegetational features, and also in the influence which man has exerted upon the latter, a brief description of each of the seven main divisions is here given.

NONAMESSET. This island, the easternmost of the chain, is roughly oblong with a length of 1¼ miles and a greatest width of ½ mile. Its longitudinal axis lies east and west. The eastern three-quarters of Nonamesset is essentially treeless, save for an occasional wooded depression, while the western quarter is heavily clothed with mixed beech and oak woods. The rather sharp line between these two areas, a line which follows, for the most part, an old stone wall, indicates that the

treeless nature of the eastern portion is due to artificial denudation, it probably having been cleared for purposes of agriculture or grazing. Altogether there are about 15 ponds of more or less permanent character on Nonamesset and all but one of these lie in the exposed eastern portion. Munsod Pond, as it appears on the charts, has now become merely an arm of Lackey's Bay and the narrow bar which formerly protected it has been submerged. Nonamesset is connected with Naushon by three bridges which cross the narrow gates or "gutters" separating Monohansett and Buck Islands. The East and West Gutters are open and the rapid current flows through them as through a mill race, but the Middle Gutter is "blind," being closed by the stone wall that forms the bridge.

UNCATENA is a triangular-shaped island about ¾ of a mile long and ½ a mile wide. It lies to the west of Nonamesset across Hadley Harbor and forms a wedge that juts northward into Buzzards Bay. Uncatena is practically treeless, except for a small natural area in the extreme southern corner, and here again the assumption is that active deforestation has been carried on, for it was from the originally densely wooded nature of Nonamesset and Uncatena that Woods Hole is said to have derived its name. There are about a dozen small fresh water ponds on Uncatena during the course of a moderately rainy summer and a large inland brackish pond drains eastward into Hadley Harbor by a sluice-way which makes of the northeastern part of the island a peninsula. Dry, exposed, undulating grassland characterizes the vegetation of nine-tenths of this island, with an increase of scrubby thicket to the westward. The summer home of Mr. Malcolm Forbes is located on the east side of Uncatena and a large central area is fenced off for grazing. This island connects by a bridge across the Northwest Gutter with Naushon.

NAUSHON is the largest of the Elizabeth Islands. It is 6½ miles long and averages 1 mile wide, with a width of about 1½ miles at its widest point. It extends from Hadley Harbor almost due southwest to Robinson's Hole which separates it from Pasque. By far the greater part (perhaps ¾) of the surface of Naushon is covered with a dense growth of trees. In some regions, like the area near French Watering Place, these woods present an almost pure stand of beech, in others there is considerable admixture of oak, hickory, hop hornbeam, maple and black gum. Almost the only portions of Naushon which are not wooded are those right along the shore or some of

the higher exposed ridges in the central part of the island. Along the north shore, on one of these treeless stretches, Scotch Broom (*Cytisus scoparius*) was introduced some years ago and has taken hold so vigorously that it now solidly occupies an area of several acres. In similar spots along this same shore, various conifers (notably larch, Scotch pine and several spruces) have been set out as a windbreak and these appear to be no more than holding their own. Naushon has many ponds, nearly all of them fresh. West End Pond, Mary's Lake and French Watering Place are the three largest, in the order named, and there are about a score of smaller ones, depending upon the degree of rainfall. The island is indented by two large coves, Tarpaulin Cove and Kettle Cove, which are nearly across from each other on opposite shores. It has been suggested that it was by the approximation of similar indentations that Nashawena was separated from Pasque in comparatively recent times and that the same process may be going on here in Naushon. The gravel cliffs which in many places form the south shore of the island are high and very precipitous. East of Tarpaulin Cove they are usually barren on their crests, while westward they are frequently wooded right to the very edge. Naushon presents several areas of low brackish marshland, the most extensive being near Job's Neck and at the west end near West End Pond. At the east end of the island are the several residences of members of the Forbes family. Here, also are tracts under cultivation and scattered farmhouses and outhouses.

Pasque. Lying across Robinsons Hole from Naushon is the island of Pasque, or Peskinese, as it was formerly called. Pasque is roughly oval in form, with a long axis, lying east and west, of $1\frac{1}{2}$ miles, and a short one about 1 mile. It is almost entirely destitute of trees, save for a few protected hollows. The extreme eastern end is low and marshy, and is drained by a sinuous tidal stream. Numerous fresh water ponds are scattered around the rim of the island, for the central part is high and arid. As on the other islands, the depressions among the hills near the shore are often peaty and boggy and several extensive areas of this sort are to be found here. Pasque was formerly the property of a fishing club. As evidences of this are a large frame club-house, a landing wharf, a truck patch and outhouses, including an ice-house on the edge of a small pond; all at the eastern end of the island. The ownership of Pasque has just recently passed into private hands. Between Pasque and Nashawena lies Quicks Hole.

NASHAWENA. The second largest island of the group is Nashawena (formerly Nashuina), or "Little Naushon," with a length of 3 miles and an average width of about a mile. Nashawena contains large wooded areas, chiefly toward the east end, although in the troughs between the long ridges of hills that traverse the island longitudinally trees may be found, except in the western quarter. The shores and the extreme western portion are barren and open, as are likewise the higher hills throughout. Behind the line of dune hills, which forms most of the eastern border of the island, lie two large ponds of fresh water separated by a low swampy area: these are known as "the dune ponds." The easternmost of these ponds is separated from the sound by a low barrier beach, and evidence indicates that inundations of salt water probably occur occasionally during the severe storms of winter. It seems also likely that these two ponds have from time to time been connected as a single body of water. Here again, as on Naushon, the highest land is along the southern side of the island and the slope is to the north. Many of the hollows, especially around the margin of the island, harbor small ponds, and in addition to the dune ponds there are several good sized bodies of water, the largest of which is Choptauk Lake, two-thirds of the way to the west end. There are numerous swampy and boggy areas on Nashawena, most of them occurring in the central parts of the island in the wide depressions between the lines of hills. In many cases these swampy hollows are overgrown by tangles and thickets so dense as to be well nigh impenetrable. It is supposed that, at one time, much of the open land on Nashawena was under cultivation. The old stone farm house, said to have been built in 1725, still stands, although a modern wing has been added to it in recent years. An obscure gravestone bears the date 1736. Today the island belongs to the Forbes family and is used chiefly for the raising of sheep, of which there are thought to be about 700. The caretaker and his wife, Captain and Mrs. Mark Jamison, occupy the new wing of the old farmhouse, and to their kind hospitality the writer owes a very enjoyable and botanically profitable visit to the island in July, 1928.

CUTTYHUNK. West of Nashawena, and separated from it by a very narrow passage, Canapitsit Channel, lies the island which Gosnold in 1602 named Elizabeth's Isle but which has reverted, with some modification, to the old Indian name of Cuttyhunk. Roughly oblong n shape, the main body of Cuttyhunk is some 2 miles long, with a

greatest width of about ¾ of a mile, and lies along a NE-SW axis. From its southeastern corner a narrow sand-spit runs due east for ¾ of a mile toward Nashawena. On this strip is located U. S. Coast Guard Station No. 50. The northeastern quarter of the island is occupied by a large body of salt water known as Cuttyhunk Pond. To the east this is dredged to Cuttyhunk Harbor and thus offers a land-locked refuge to small vessels. West of Cuttyhunk Pond is the little village of Gosnold, spread out upon the sheltered east-facing slope which leads down toward the wharf. All of the central and western portions of the island are open grassy downs, exposed to the full blast of winds from the Atlantic. From the lookout station on the highest hill, near the center of the island, the land slopes gently away to the south and southwest. The low-lying western part of the island is occupied by two bodies of water. One of these is fresh and furnishes the supply of ice for the inhabitants; it has long been known to visiting botanists as Ice-house Pond or Sheep Pond. The other is the pond made known to fame by Gosnold and is variously termed Gosnold Pond or West End Pond. Although originally mentioned as a fresh-water pond, and still referred to as such, this body of water, which is separated from the open sea by a very narrow cobble barrier beach, is certainly frequently inundated. In 1927, *Potamogeton bupleuroides* and *Ruppia maritima*, var. *longipes*, both reliable indicators of a brackish medium, were found growing in it and in 1928 various species of marine algae were collected along its northern shores. Toward the western end of this pond is the tiny island upon which stands the monument to Gosnold already mentioned, an unpretentious structure of rough native stone. Not far from this, but on the extreme western edge of the main island, stands the Cuttyhunk lighthouse. Several smaller ponds and numerous boggy hollows, some of them rather extensive, are scattered over the western and southern portion of the island, but these tend to disappear late in summer when the rainfall is less abundant.

Penikese. The smallest of the main divisions of the Elizabeth Islands lies a mile to the north of Cuttyhunk. Known also to Gosnold as a cedar covered isle, and called by him Hills Hope, this island likewise goes today by its Indian name and is, if possible, even more barren and treeless than Cuttyhunk. Penikese is about ⅔ of a mile long and ½ a mile wide, with a broadly spatulate peninsula running eastward for ¼ mile from its northern end. Its contour resembles

that of the other islands, the highest point, however, being only about 70 feet. Its few trees are mostly the result of an attempt at a planting made around the building which, in the days of the leper colony, served as the home of the resident physician, although several scrub willows grow in one of the hollows around the margin of a small pond on the east side. Of the former luxuriant forest growth Dr. Jordan, writing in 1874, says, "there is now no trace left save the rotten roots of a solitary beech stump and a few branches of red cedar and red maple (?) found buried in the muck of a small swamp." The status of the ponds on Penikese appears to be even more precarious than of those on the other islands. In favorable seasons six small ponds, two of them brackish, may be found; during a dry summer the number has been known to be reduced to half. Penikese, then, is dominated by open, grassy downs with the exception of the narrow cobbly strip which connects the two portions of the island. That part of the open hillsides forming the northern slope of the island has been taken over by the terns (common and roseate), thousands of which here find their breeding ground. In fact, now that the island has reverted to its wilder state, these birds show a tendency to usurp it altogether. It is extremely difficult to walk across any of the grassland areas during the nesting season without stepping upon the eggs or the young birds. The handsome stone residence building, on the east side near the landing, has been partly demolished, leaving only a portion of the structure to house the caretaker who is still stationed there. The frame cottages on the west side of the island, formerly occupied by the unfortunate lepers, were destroyed in 1927, a single concrete structure being all that remains. This, and the tiny graveyard at the extreme north end of the island, bear mute testimony to the use to which Penikese was put from 1905 to 1921. The remains of an old wooden reservoir cap the highest hill on the island, while, set in a large boulder near by, is a bronze tablet placed there in 1923 to commemorate the fiftieth anniversary of the founding of the Anderson School of Natural History by Jean Louis Rodolphe Agassiz in 1873.

(*To be continued*)

An Interesting Form of Eupatorium perfoliatum.—While collecting with Mr. C. H. Knowlton in Westport, Massachusetts, on the field-trip of the New England Botanical Club, September 28, 1929,

the writer came across a clump of *Eupatorium perfoliatum* L. which looked rather unusual. The leaves were truncate toward the base as in forma *truncatum* (Muhl.) Fassett and the upper were not perfoliate, but they were much more strongly serrate than usual in that variety or the typical form, being almost laciniate. Near by were clumps showing transition to the typical form, both in the serration and the perfoliate character of the leaves. This peculiar form may be described as follows:

EUPATORIUM PERFOLIATUM L. forma **laciniatum**, n. f., foliis truncatis, non perfoliatis, laciniato-serratis; serraturis 4–9 mm. longis. TYPE in New England Botanical Club Herbarium, from damp thicket near West Branch of Westport River, Westport, MASSACHUSETTS, *C. H. Knowlton & G. L. Stebbins, Jr.*, no. 658.—G. L. STEBBINS, JR., Harvard University.

SCIRPUS PECKII IN MAINE.—While botanizing about Songo Pond in the town of Albany, Maine, one day last summer I had the good fortune to find a plant of what Professor Fernald later identified as *Scirpus Peckii* Britt., noting that it is "The first authentic collection from Maine." The plant was growing in company with *S. georgianus* Harper on the border of a bog.

On the sandy shore and in the shallow water at the north end of this same pond was a great abundance of *Utricularia cornuta* Michx. and associated with it was the rarer *U. resupinata* B. D. Greene.

Other plants of special interest in or around the pond were *Sarracenia purpurea* L., *Pontederia cordata* L., *Pogonia ophioglossoides* (L.) Ker., *Lycopodium inundatum* L., *Sagittaria latifolia* Willd., forma *gracilis* (Pursh) Robinson, *Cephalanthus occidentalis* L. and *Ranunculus Flammula* L., var. *reptans* (L.) Mey.—LESTON A. WHEELER, Bethel, Maine.

FERNS OF THE RED RIVER COUNTRY, MAINE

JOSEPHINE F. CLARK

IN the Red River country, in the northern part of Aroostook County, Maine, not far from the Canadian border, is a comfortable log cabin on a small pine-crowned island in Island Pond. This is headquarters for three city folk who once a year, about the middle of August, after an all day tramp through the forest, emerge upon the shore, and once more feast their eyes on the sight of that cabin and

the pines and the half mile of pond, and rejoice in the thought of weeks of joyous freedom there.

The Red River country lies on high land, in which rise some of the tributary waters of the St. John, the Aroostook, the Allegash and the Fish Rivers. Red River itself is not large. It flows out of Poissoniere Pond into Fish River, about twenty miles below. This high land of many hills and a few real mountains, of which Mt. de Bouillé (2,800 ft.) is the highest, is a region of forest and many spring-fed lakes, ponds and streams. Geologically the rock formation is much disturbed.

Not far from camp is a small oval clearing about 200 yards long, gay with flowers; the large everlasting, black eyed susans, daisies, clover, galium and golden rod. The clearing was made about twelve years ago by an early camper, who grew hay there for his horses. Since his departure seven years ago, the forest has been encroaching on the little clearing once more, and the advance guard of young balsams threatens to obliterate it entirely.

It slopes gently down toward Upper Pond, a most lovely spot, where always we linger. Growing thickly at either side of the trail, pushing up through the sparse grass, grow *Botrychium ternatum* var. *rutaefolium* (A. Br.) DC., and among them, though much fewer in number, are *Botrychium matricariaefolium* A. Br., about fifty or sixty plants.

But that is not all! At the upper end of the clearing we found a few plants of a third *Botrychium*, which my amateur study of fern books classed as *B. lanceolatum*, var. *angustisegmentum* Pease & Moore. However later, showing it to Mr. C. A. Weatherby, of the Gray Herbarium at Cambridge, he pronounced it to be, not the above form usually found in the United States, but the typical European form, *B. lanceolatum* (Gmel.) Angstroem, found rarely in boreal North America, and not previously recorded from the eastern United States.

I also found in this same region on at least eight rocky cliffs, usually with a northern exposure, *Thelypteris fragrans* var. *Hookeriana* Fernald. On one shady irregular perpendicular cliff, 150 to 200 ft. in height, extending for about half a mile, there were certainly 200 plants, some being magnificent specimens. Their favorite place of growth was on a small shelf with an overhang of rock above them, and always they were found high up, above most other ferns. At a certain line of altitude all along a cliff, *T. fragrans* began to appear.

In August, 1928, I found on this cliff a delicate little fern that I couldn't place at all, and on showing my two unfruited specimens to Mr. Weatherby, he too was puzzled by them, and kept them for further study. He decided that they were stunted, starved specimens of *T. fragrans* var. *Hookeriana* Fernald, but lacking many of the characteristics of the normal form. They were from 2 to 5 in. in height, thin and fragile, lacking in chaffiness, but having minute glands. In August, 1929, I was able to collect a series of the above, definitely connecting the small starved form with the normal.

On some of the same rocky cliffs, but at a lower level, grew *Woodsia glabella* R. Br. There were not many of them, and they were mostly rather small not very vigorous plants. One plant beside a mossy trickle of water in a slight break in the wall of rock, grew strong and lusty, standing out from the others. Prof. M. L. Fernald suggested that some lime might have been brought down to it from above by the moisture. *Woodsia glabella* has been collected at least twice before in Maine; but for *W. alpina* (Bolton) S. F. Gray, of which I found a few on these same cliffs, this is the first station in the state. Prof. Fernald had found *W. alpina* growing along the Aroostook River in New Brunswick, but search west of the line was unsuccessful.

Woodsia ilvensis (L.) R. Br. grew plentifully on almost all the cliffs with varying characteristics according to the amount of shade or sunshine in which they grew.

There has been heretofore no collecting done in this Red River region, so that forms found there have a special interest. Beside the rarer ferns mentioned there was a wealth of others.

The following is a complete list of the ferns I have already found in the Red River Country of Northern Maine:—

POLYPODIUM VIRGINIANUM L.
PTERIDIUM LATIUSCULUM (Desv.) Hieron.
THELYPTERIS PHEGOPTERIS (L.) Slosson.
THELYPTERIS DRYOPTERIS (L.) Slosson.
THELYPTERIS CRISTATA, var. CLINTONIANA (D. C. Eaton) Weath.
THELYPTERIS FRAGRANS, var. HOOKERIANA Fernald.
THELYPTERIS MARGINALIS (L.) Nieuwl.
THELYPTERIS NOVEBORACENSIS (L.) Nieuwl.
THELYPTERIS SPINULOSA, var. INTERMEDIA (Muhl.) Nieuwl.
THELYPTERIS SPINULOSA, var. AMERICANA (Fisch.) Weath.
THELYPTERIS PALUSTRIS Schott, var. PUBESCENS (Lawson) Fernald.
ATHYRIUM ANGUSTUM (Willd.) Presl.
ATHYRIUM THELYPTEROIDES Michx.

Polystichum acrostichoides (Michx.) Schott.
Polystichum Braunii (Spenner) Fée, var. Purshii Fernald.
Cystopteris bulbifera (L.) Bernh.
Cystopteris fragilis (L.) Bernh.
Woodsia ilvensis (L.) R. Br.
Woodsia alpina (Bolton) S. F. Gray.
Woodsia glabella R. Br.
Onoclea sensibilis L.
Pteretis nodulosa (Michx.) Nieuwl.
Osmunda regalis, var. spectabilis (Willd.) Gray.
Osmunda Claytoniana L.
Osmunda cinnamomea L.
Botrychium lanceolatum (Gmel.) Angstroem.
Botrychium matricariaefolium A. Br. (*B. ramosum* (Roth) Aschers.)
Botrychium ternatum, var. rutaefolium (A. Br.) D. C. Eaton
Botrychium virginianum (L.) Sw.

Boston, Mass.

THE NAMES ASTER ERICOIDES AND A. MULTIFLORUS

S. F. Blake

When publishing[1] recently two new varietal names under *Aster multiflorus* Ait., I overlooked a paper by Mr. K. K. Mackenzie[2] in which he showed that the name *Aster ericoides* L., long universally used in another sense, should be taken up for *A. multiflorus.* The name *Aster ericoides* was based by Linnaeus on two references, Gronovius' "*Aster caule paniculato, pedunculis racemosis, pedicellis foliosis, foliis linearibus integerrimis,*" and Dillenius' "*Aster ericoides, dumosus.*" The specimens on which these names were founded were long ago identified by Dr. Gray[3] as *A. multiflorus* Ait. The specimen from the Upsala Garden labeled *ericoides* in the Linnaean Herbarium, which represents a garden state of the *A. ericoides* of authors, was not in the Linnaean Herbarium in 1753 (about which Dr. Gray was uncertain), and consequently does not figure in the identification of *A. ericoides* as originally described. The current misapplication of the name *A. ericoides* originated with Aiton[4] in 1789. Aiton's misinterpretation has been followed by nearly all subsequent authors, although Michaux (1803) and Schkuhr (1803), as cited by Gray in 1884, used this name for plants not more than varietally separable from the original *A. ericoides* L. Gray himself stated that the name

[1] Rhodora **30**: 227–228. 1928.
[2] Rhodora **28**: 65. 1926.
[3] Proc. Amer. Acad. **17**: 165. 1882.
[4] Hort. Kew. **3**: 202. 1789.

A. ericoides should have been continued by Solander[1] for the Dillenian and Gronovian plant, "unless he could ascertain that the specimen in the Upsal Garden was in the herbarium as early as the year 1753." Instead of making this needful correction, Gray chose to continue the usage established by Aiton, in which he has been followed by all American authors until the publication of Mr. Mackenzie's note.

In view of the fact that several varieties of *Aster multiflorus* have been described since Dr. Gray examined the plants forming the foundation of Linnaeus's description, it has seemed wise to obtain more definite information about certain specimens in European herbaria. *Clayton* 194, in the British Museum, the basis of Gronovius' "*Aster caule paniculato, pedunculis racemosis, pedicellis foliosis, foliis linearibus integerrimis,*"[2] has been examined by Mr. George Taylor, who informs me that the hairs on the upper part of the stem are appressed, but not closely so, and that the pubescence on the lower part varies considerably, some of the hairs being spreading. It is evident from his notes that the plant is to be placed under typical *A. multiflorus* and not under the variety which has wide-spreading pubescence throughout. Mr. G. Claridge Druce reports that the stem pubescence is appressed in the Dillenian specimen which is the basis of his "*Aster ericoides, dumosus.*"[3] An excellent photograph of the type specimen of *Aster villosus* Michx. in the Michaux Herbarium, taken for me by Mr. A. Cintract with the permission of Prof. H. Lecomte, is available. The type consists of only the upper part of the plant, but the comparatively large and broad involucre, the conspicuous spreading pubescence of the stem, and the very narrowly linear stem leaves leave no room for doubt that the name is properly identified in Torrey and Gray's Flora and in Gray's Manual with that phase of "*ericoides*" which differs from the typical form of that species (as usually understood) only in the presence of copious pubescence. The two type sheets of *Aster multiflorus* var. *caeruleus* Benke, in the Field Museum of Natural History, have also been examined through the kindness of Mr. Paul C. Standley. In these the pubescence of stem and branches is ascending or subappressed; the rays, as noted by the collector, were blue with a suggestion of purple. I cannot separate them from the western plant described by Piper as *A. columbianus*, the rays of which were described as violet.

[1] As to the part taken by Solander and Dryander in the preparation of Aiton's "Hortus Kewensis" see J. Britten, Journ. Bot. **50**: Suppl. **3.** 1912.

[2] Gron. Fl. Virg. 100. 1739; ed. 2. 124. 1762.

[3] Hort. Elth. 40. *pl. 36, f. 40.* 1732.

The name *Aster ericoides* L. being necessarily transferred to the plant generally known as *A. multiflorus* Ait., it remains to find a name for the *A. ericoides* of our manuals and floras. The earliest specific name applied to any form of "*A. ericoides*" of authors is evidently *Aster villosus* Michx. (1803), a name unfortunately preoccupied by *A. villosus* Thunb. (1800). The latter name is referred to the synonymy of *Felicia angustifolia* in the Index Kewensis, evidently on the basis of De Candolle's placing of it in the synonymy of *Felicia angustifolia* α. *hyssopifolia* (Berg.) DC.[1] Nees' *Felicia angustifolia* (1832) was based on "*Aster angustifolius* Willd. Sp. pl. III. 3. p. 2017. n. 12. ex parte" (1803), a name which depends on *Aster angustifolius* Jacq. (1798). In Harvey's treatment of the Compositae in the Flora Capensis (**3**: 71, 73, 75. 1864) the genus *Felicia* is sunk in *Aster*, and *A. angustifolius* Jacq. and *A. hyssopifolius* Berg. are treated as distinct, the name *A. villosus* Thunb. not being mentioned even in synonymy. Willdenow[2] retained *Aster villosus* Thunb. as a valid species of *Aster* and gave the new name *A. pilosus* to *A. villosus* of Michaux. Under the American Code Willdenow's name must be retained, and the same course would seem necessary under the International Rules, since, in view of the lack of agreement regarding the status of the genus *Felicia* and the uncertainty regarding the identity of *Aster villosus* Thunb., the latter name can scarcely be considered to be "universally regarded as non-valid."[3] The names to be used for the species which have been called *A. ericoides* and *A. multiflorus*, and their varieties, are the following:

ASTER ERICOIDES L. Sp. Pl. **2**: 875. 1753. *Aster multiflorus* Ait. Hort. Kew. **3**: 203. 1789. *Aster multiflorus* β. *stricticaulis* Torr. & Gray, Fl. N. Amer. **2**: 125. 1841. *Aster multiflorus* var. *exiguus* Fernald, RHODORA **1**: 187. 1899. *Aster exiguus* Rydb. Bull. Torrey Club **28**: 505. 1901, as to name-bringing syn. only. *Aster stricticaulis* Rydb. Fl. Rocky Mount. 885, 1067. 1917.

This plant, the *Aster multiflorus* of practically all authors for more than a century, must be called *Aster ericoides* L.

A. ERICOIDES var. **prostratus** (Kuntze). *Aster multiflorus* β *prostratus* Kuntze, Rev. Gen. Pl. **1**: 313. 1891. *Aster multiflorus* var. *pansus* Blake, RHODORA **30**: 227. 1928.

[1] Prodr. **5**: 220. 1836.

[2] Sp. Pl. **3**: 2017, 2025. 1803.

[3] Under the modified interpretation of Art. 50 of the International Rules recently proposed by Briquet and by Sprague, it would be necessary in any case to reject the name *Aster villosus* Michx., since the earlier homonym of Thunberg was proposed as a new species.

Distinguished by its wide-spreading pubescence, that of the typical form being appressed or merely ascending. Kuntze's *A. multiflorus* β *prostratus* was defined in the following words: "caulis prostratus ramis erectis," being contrasted with his α *normalis*, of which he says "caulis erectus." Examination of the type (Nebraska, Sept. 1874, *Kuntze*), kindly lent by Dr. J. K. Small from the herbarium of the New York Botanical Garden, shows that it is the form with spreading pubescence. Dr. J. K. Small writes me that no named material of α *normalis* is in Kuntze's herbarium. The habital differences on which Kuntze relied in separating his two varieties are obviously of no importance. *Aster hebecladus* DC. Prodr. **5**: 242. 1836, and *A. scoparius* DC. (not Nees, 1818), l. c., are very closely related forms from the arid southwestern United States, which may require reductions to synonymy under var. *prostratus*.

A. ERICOIDES f. **caeruleus** (Benke). *Aster columbianus* Piper, Contr. U. S. Nat. Herb. **16**: 210. 1913. *Aster multiflorus* var. *caeruleus* Benke, RHODORA **30**: 78. 1928. *Aster multiflorus* var. *columbianus* Blake, RHODORA **30**: 227. 1928.

This plant, distinguished from the typical form of *A. ericoides* only by the blue or violet color of its rays, is better treated as a forma than a variety.

ASTER PILOSUS Willd. Sp. Pl. **3**: 2025. 1803. *Aster villosus* Michx. Fl. Bor. Amer. **2**: 113. 1803 (Not *A. villosus* Thunb. 1800). *Aster ericoides* β. *villosus* Torr. & Gray, Fl. N. Amer. **2**: 124. 1841. *Aster ericoides pilosus* Porter, Mem. Torrey Club **5**: 323. 1894.

This is *Aster ericoides* var. *villosus* of recent authors.

A. PILOSUS var. **platyphyllus** (Torr. & Gray). *Aster ericoides* γ. *platyphyllus* Torr. & Gray, Fl. N. Amer. **2**: 124. 1841.

A. PILOSUS var. **demotus**, var. nov. *Aster ericoides* Ait. Hort. Kew. **3**: 203. 1789, not L. (err. ident.). *?Aster glabellus* Nees, Syn. Aster. 31. 1818.—Plant glabrous or very sparsely pilose; leaves narrow; heads numerous, panicled, the panicle branches more or less racemiform. TYPE no. 356711, U. S. National Herbarium, collected near Virginia Beach, Princess Anne County, Virginia, 1 Oct. 1898, by T. H. Kearney (no. 2059).—Maine and Ontario to North Carolina and Missouri, common.

This is *A. ericoides* of practically all authors since Aiton, except Michaux (Fl. Bor. Amer. **2**: 113. 1803), and Schkuhr (Bot. Handb. 105. *pl. 245*. 1803), both of whom used the name *A. ericoides* in essentially its Linnaean sense—that is, for some form of *A. multiflorus* Ait. Although *Aster glabellus* Nees (a name wrongly attributed by

its author to Michaux) is referred by Gray to the synonymy of *A. ericoides*, the description is not entirely convincing, and the name is best passed over. Specimens of the present form with stems absolutely glabrous are difficult to find. The name *pilosus* should be restricted to those plants in which the stem is conspicuously hairy, and the subglabrous plants referred to var. *demotus*.

A. PILOSUS var. **pringlei** (Gray). *Aster ericoides* var. *pringlei* Gray, Syn. Fl. **1**^{2}: 184. 1884. *Aster pringlei* (Gray, Proc. Amer. Acad. **16**: 99. 1880, nomen nudum); Britton in Britton & Brown, Ill. Fl. **3**: 379. 1898.

A. PILOSUS var. **reevesii** (Gray). *Aster ericoides* var. *reevesii* Gray, Syn. Fl. **1**^{2}: 184. 1884. *Aster reevesii* Hort.; Gray, l. c. as synonym. 1884.

An ambiguous form. *Aster priceae* Britton, Man. 960. 1901, and *A. kentuckiensis* Britton, l. c., are closely related and when better known may prove to be synonymous with this variety or recognizable as independent varieties.

BUREAU OF PLANT INDUSTRY,
Washington, D. C.

CUBELIUM CONCOLOR

EDWIN H. EAMES

So little has been written concerning *Cubelium concolor* (Forst.) Raf. that it seems worth while to note some observations in relation to it.

The type was described as having stems hispid throughout, was in cultivation and of North American origin. Such hispid plants occur here and there nearly throughout the range of the species, but usually are glabrous below and in varying degree to the summit. The hairs are of several kinds, all segmented. Those strictly hispid sometimes occur alone and rather sparsely. Commonly these are more or less obscured by mixture with glistening white, flattened, irregular hairs which, when abundant, give a coarse, somewhat woolly appearance to the stem. Among the latter may be some spiral hairs and some with the planes of the flattened segments at diametrical right angles, the terminal one ensiform.

There is every degree of lesser hairiness to that in which it is reduced to narrow lines toward the summit of the stem, a scant pubescence, or

entire glabrousness. These characters and more are easily seen with a hand-lens.

The plant is at least locally common in the Central States and has long been known eastward to central New York and the Delaware valley. Further east but three stations appear in the records: NEW YORK: "Lebanon," Columbia Co., *L. C. Beck*,[1] near the Massachusetts State line west of Pittsfield; Pine Plains, Dutchess Co., *L. H. Hoysradt*,[2] about eight miles from the Connecticut State line, where, "in a cold mountainous woods" on Mt. Ararat, "it was growing luxuriantly—many of the stems being all of three feet in height—and covered several acres . . . . almost to the entire exclusion of other herbaceous plants"; Tarrytown, Westchester Co., 1864, *I. H. Hall*,[3] five miles from the Connecticut State line.

On May 17, 1929, I found a long-established colony of it in the Housatonic valley at Southbury, New Haven County, Connecticut, the flowers immature, and, excepting cilia on leaves and stipules, the plants essentially leavigate throughout. It grew often in clumps of 10–30 stems, with smaller groups and a few solitary stems skirting the colony. Later collections had slight pubescence, mostly in narrow lines, while some clumps had stems sparsely hispidulous toward the summit, thus approaching the type, but the flowers and capsules were too small to fit descriptions.

Fresh flowers never exceeded 6 mm. long; most of them were 5–5.5 mm., or when dried 4–5 mm. The capsules rarely exceeded 15 mm. in length, with a diameter of 12–13 mm. Other similar specimens in herbaria have capsules normal for the species, at least to 21 mm. long. Western specimens of the species often have flowers about 1 mm. longer.

This nearly or quite glabrous phase of the species, being extreme and easily recognizable, was distributed by me to several herbaria under a manuscript varietal name. While its status may be a matter of point of view, it is here proposed as

CUBELIUM CONCOLOR (Forst.) Raf., f. **subglabrum**, f. nov., caulibus omnino glabris, vel lineis angustis leviter pubescentibus ornatis, vel superne sparsissime hispidulis.

Stems glabrous throughout, to slightly pubescent in narrow lines, or very sparsely hispidulous at the top.—Southern Ontario to Con-

[1] Botany of the Northern and Middle States, 42. 1833.
[2] Bull. Torr. Bot. Club **5**: 37, 47. 1874.
[3] Bull. Torr. Bot. Club **1**: 6. 1870.

necticut and Alabama. ONTARIO: London, 1881, *Burgess*. NEW YORK: Collins, Erie Co., *Anne E. Perkins*, no. 75,316 in part. Various stations in the central part of the State. CONNECTICUT: in pockets of rich soil among coarse blocks of talus near base of wooded slope, Southbury, New Haven Co., June 2, July 7, 1929, *E. H. Eames*, no. 10,876. NEW JERSEY: Hunterdon Co., *H. W. Pretz*, no. 2964. PENNSYLVANIA: Lehigh Co., Bethlehem, 1869, *A. F. K. Krout;* near Allentown, *Krout*, *Pretz*, no. 2489; along Jordan Creek, *Pretz*, no. 8457 some large colonies for several miles, partly in lime-stone soils and talus. Apparently rare at various points to GEORGIA: bank of Savannah River, Germain's Island, Columbia Co., *R. M. Harper*, no. 1297 (TYPE in Gray Herb.); Rome, Hb. *A. W. Chapman*. ALABAMA: without locality, May, 1841, *S. B. Buckley*, no. 1; Clay Co., 1897, *F. S. Earle*. TENNESSEE: *S. B. Buckley;* Knoxville, 1898, *A. Ruth*, in part.

In some localities plants typical of both the species and the form have been collected and distributed with the same data. In both the capsules have the sides parallel toward the apex which is rather squarely obtuse, due to abrupt incurving of the valves to the depressed style-base. Rhizomes are distorted, knotted, very hard, often massed. Main roots are cord-like with rootlets whitish, irregularly much branched and interlaced, of nearly constant size, and forming bulky masses sometimes 35 cm. long. Some clumps growing in leaf-mold topping cavernous spaces had the lower rootlets suspended, with the soil merely adherent.

Young stems are succulent, brittle, while dead ones of the preceding year lying about commonly show some wind-whipped fibres in coarsely fibrous gray integument. A little search in the litter may reveal buff-colored, wide-spreading open capsules or valves.

Throughout its range the species shows a preference for well-drained slopes, especially near the base of wooded talus which is very often limestone or containing lime, and occurs in colonies often extensive. Noteworthy specimens include one from "Hot Springs, Little Rock" Hb. *George Engelmann*, Sept., 1835, growing in "saline" conditions, having a stem 40 cm. tall and two leafy branches 18 and 19 cm. long; and one plant of the form in flower, Rome, Georgia, Hb. *A. W. Chapman*, with the stem 24 cm. long and leaves about 12 by 40 mm.

My thanks are due to Prof. J. M. Greenman, C. A. Weatherby, H. D. House, H. W. Pretz, and others for specimens or other helpful assistance.

BRIDGEPORT, Connecticut

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COLOR VARIATION IN GENTIANA LINEARIS

R. J. Eaton

One of the conspicuous plants of the Wilmington-West Dover-Stratton region of Windham Co., Vermont is *Gentiana linearis* Froel., abundant along wet road-sides, sour fields and bogs, and even in open woods. In its usual habitat, this species occurs very rarely with blue to lavender corolla-lobes separated by white plaits or with pure white corollas. Just how rare the white form is may be inferred from the fact that there are only two sheets all told in the Gray Herbarium and the Herbarium of the New England Botanical Club. Several botanists with wide field experience state that they seldom if ever have collected it. In an article entitled "Some Forms of American Gentians" Fernald published it[1] as forma *Blanchardii* based on the single specimen in the Gray Herbarium collected from "an open road-side" at Woodford, Vermont by *W. H. Blanchard*, August 15, 1902.

The rarity of *G. linearis* forma *Blanchardii* seems to indicate that it is merely an albino form. Some question as to the correctness of this view is raised by the prevalence of the white form in a sphagnum bog near the Jacksonville-Wilmington line at an altitude of 1600 ft. Growing profusely in wet moss with typical bog associations such as *Kalmia polifolia* and *Vaccinium Oxycoccus*, plants bearing pure white corollas, tipped with green, are overwhelmingly predominant. Occasional plants of the typical blue form grow side by side with the white under identical soil and light conditions. No gradations of color have been noticed. This station has been under the writer's observation for two years. Another station, which he has not visited

[1] Rhodora, XIX, 152, 1917.

but from which many fresh specimens were collected, lies some twelve miles to the northward in West Dover at an altitude of 2300 ft. Here also, according to report, the white form occurs commonly, and the blue rarely, in sphagnum.

A careful examination of a series of fresh and dried material reveals no distinctive characters, other than color of corolla. Each dried specimen of the white form in my possession is distinguishable at once from the blue form by the conspicuous green tips of the corolla lobes. A random series of blue and white specimens, duly separated by sheets and marked for identification, were dried in a press between ventilators, with insufficient external heat. Some of the corollas of each color form, but none of the leaves, turned brown in drying. In no case did the dried corollas of the blue form, whether blue or brown, show green tips. In every instance the tips of the corolla lobes of the white form retained their green color. Unfortunately, this character proves to be "no good." An examination of all pertinent material in the Gray and Club herbaria discloses an occasional sheet of typical *G. linearis* with green-tipped corolla lobes, as for instance a beautifully preserved specimen from Shirley, Mass., August 28, 1916, *J. R. Churchill.* Furthermore, the type specimen of forma *Blanchardii* shows the merest trace of green on one corolla. On the other hand, the only other collection of the white-flowered form (Stratton Plateau, Vt., August 6–10, 1900, *W. W. Eggleston*, no. 2057) to be found in either herbarium shows mostly green-tipped corollas, otherwise browned with age. However, this latter is indistinguishable from occasional sheets of typical blue *G. linearis* likewise discolored.

If subsequent experiment shows that seedlings of white gentians from this bog produce white flowers under cultivation and that no reversion to blue occurs when white-flowered plants are transplanted from sphagnum to normally acid soil, it would appear desirable either to treat forma *Blanchardii* as a true albino and base a second color form on this new material, or else give forma *Blanchardii* more serious consideration than is usually accorded to mere albinism.

CAMBRIDGE, MASSACHUSETTS.

A GLABROUS VARIETY OF ASTER CONCOLOR.—*Aster concolor* L. is ordinarily one of the most distinct and easily recognizable of the North American species of *Aster*, with its virgate stems thickly clothed with small, entire, oblong to elliptic or linear leaves, gradually

reduced above and usually canescent, and its normally racemiform panicles of rather small violet heads with silky-canescent involucre. The common Florida form has comparatively large heads and a longer involucre than specimens from other localities, and the phyllaries are usually notably broad and with conspicuous herbaceous tips; forms occur in Florida, however, with the phyllaries of the equally long involucre decidedly narrow and loose, or almost squarrose. The occurrence of similar specimens with long involucre and broad phyllaries at other points in the range of the species (such as *Mackenzie* 3937, from Keasbey, Middlesex Co., New Jersey, and *Miss E. C. Clay*, from Kingston, Rhode Island, 1884), however, makes it inadvisable to distinguish the common Florida form varietally. A sheet of specimens in the National Herbarium from Bay Co., Florida, with the whole habit and the silky-pubescent achenes of the species but with practically glabrous stem and involucre is, on the other hand, so very different from all the other specimens examined that it merits distinction as a variety.

ASTER CONCOLOR L. var. **devestitus**, var. nov. Stem glabrous; lower leaves sparsely hispidulous especially toward margin, the others glabrous; phyllaries glabrous except for sparse ciliolation, their bases indurate, whitish, the shorter lanceolate or subulate herbaceous tips light green. FLORIDA: In dry sandy open soil, Lynn Haven, Bay Co., 13 Oct. 1921, *C. Billington* 80 (TYPE no. 1,116,195, U. S. Nat. Herb.).—S. F. BLAKE, Bureau of Plant Industry, Washington, D. C.

ON CHANGING THE DIRECTION OF SAP CONDUCTING TISSUES

J. FRANKLIN COLLINS

AMONG my unpublished records of experiments on chestnut trees are some that may be of interest to others working along similar lines. At this time it is intended to record briefly three experiments undertaken and completed nearly 20 years ago.

EXPERIMENT 1. OBJECT: To ascertain if a chestnut tree (No. 1663-A) could be made to develop a zig-zag grain in the wood by removing portions of the bark. METHOD USED: In 1910 several horizontal grooves a half inch wide were cut through the bark of a small smooth-barked chestnut tree. Each groove extended about two-thirds around the tree. The bark was removed from each groove,

leaving a strip of exposed wood a half inch in width. The center of the first groove was on the west side of the tree, the second on the east side, the third on the west side, etc., for some distance along the trunk. The ends of each groove dovetailed in between the ends of the two adjoining grooves, above and below. Each groove was separated from the adjoining one above and below by uninjured bark from four to six inches in width. RESULTS: When the tree died from the effects of the blight at the *base* of the trunk the following year the callus around the ends of the grooves was well-formed. When the bark was removed the grain of the newly formed wood was found to have developed a zig-zag course by passing around the ends of each groove.

EXPERIMENT 2. OBJECT: To ascertain if spiral conduction in a chestnut tree (No. 1654-A) could be induced, and if spiral grain in the wood resulted. METHOD USED: In the summer of 1910 a spiral groove about half an inch wide, from which the bark was removed, was cut around the trunk of a small chestnut tree. The spiral was at an angle of 30° to 45° from the normal longitudinal grain of the trunk. RESULTS: The following spring when the tree died as a result of the blight at the base of the trunk a well-marked callus had formed along the upper side of the groove. Upon removal of the bark it was found that the fibres of the newly formed wood and bark adjoining the cambium had the grain laid down in a nearly perfect spiral, parallel to the spiral groove cut in the bark the previous year.

EXPERIMENT 3. OBJECT: To determine the maximum angle that the grain of a chestnut tree trunk could be made to turn from the longitudinal by certain experimental methods. METHOD USED: In 1910 several small trees were selected and half inch grooves were cut through the bark in various ways so as to force the grain of the newly formed wood and bark to turn from the normal longitudinal direction to various angles up to 100°, provided the formation of wood and bast fibres continued. RESULTS: The following year the grain of the newly formed wood and bark was found to have frequently turned at an angle as great as 50° to 65° from the normal longitudinal line. At one point on one tree the grain had, for a distance of two to two and a half inches, turned almost at a right angle (i. e., 87°) from the perpendicular.

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THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

JOHN M. FOGG, JR.

(*Continued from page 132*)

HABITATS

Despite their almost uniformly bleak and arid nature, the Elizabeth Islands offer a considerable diversity of habitats and the chief of these, together with a few of the most characteristic plants of each, are here described.

BEACHES. These may be of boulders, cobbles or pure white sand. In the first two cases, few plants may be sought for, although on the shingle or cobble beaches *Ammophila breviligulata* sometimes manages to get a foothold in the loose stones. The sandy beaches, however, offer a habitat for certain characteristic species, of which the following may be noted:

Ammophila breviligulata
Triplasis purpurea
Polygonum glaucum
Atriplex patula, var. hastata
Salsola Kali
Arenaria peploides, var. robusta
Cakile edentula
Lathyrus maritimus
Euphorbia polygonifolia
Convolvulus sepium, var. pubescens
Solanum nigrum
Solidago sempervirens
Xanthium echinatum
Sonchus oleraceus

On some of the beaches dead Eel Grass, *Zostera marina*, has been piled up by the waves, forming dense mats often two or three feet thick.

SALT MARSH. There are no extensive salt marshes on the islands, but a few restricted areas of this nature do occur, such as those along the southwestern shore of Nonamesset, the eastern side of Uncatena, the northeastern end of Naushon facing Lackeys Bay, the regions on the north shore at the west end of the same island, the southeastern corner of Pasque and the extreme west end of Nashawena. Other similar patches, scattered throughout, are too limited or local to merit enumeration. As typical of these low, brackish marshlands, or the slightly elevated peaty areas bordering them, may be cited:

Typha angustifolia
Andropogon glomeratus
Echinochloa Walteri
Spartina alterniflora, var. pilosa
S. patens
Distichlis spicata
Cyperus ferax
C. strigosus
Eleocharis parvula
E. uniglumis, var. halophila
E. rostellata
Scirpus Olneyi

S. validus
S. campestris, var. paludosus
Carex hormathodes
Juncus bufonius
J. Gerardi
J. articulatus, var. obtusatus
Rumex maritimus, var. fueginus
Salicornia europaea
Suaeda linearis
Spergularia leiosperma
Hibiscus Moscheutos
Ptilimnium capillaceum
Pluchea camphorata

On the brackish mud flats, like those bordering Cuttyhunk Pond, occur such characteristic things as:

Puccinellia paupercula, var. alaskana
Salicornia europaea
S. ambigua
Suaeda linearis
Spergularia leiosperma
Plantago oliganthos

Brackish Ponds. Either in the salt marsh areas themselves, or near the shore and separated from the sea only by narrow shingle barriers, occur several brackish ponds, in which may be found such plants as:

Potamogeton bupleuroides
P. pectinatus
Ruppia maritima, var. subcapitata
R. maritima, var. longipes

Fresh Water Ponds. There are at least 65 fresh water ponds of a more or less permanent nature on the Elizabeth Islands. Of these, some are mere pools 20 or 30 yards across in low hollows or kettle-holes, while others, such as West End Pond on Naushon, may have a width of nearly one-third of a mile. With this wide difference in size there goes a corresponding diversity of pond bottoms and the accompanying floras. Some of the ponds have grassy bottoms and merely represent hollows which have become filled with rain water; others have a sandy or cobbly bottom; while the bottoms of still others are formed of a thick grayish clay. As representative of the plants, floating or submerged, of these fresh water ponds may be mentioned:

Potamogeton Oakesianus
P. pulcher
P. diversifolius
Vallisneria americana
Glyceria acutiflora
Lemna minor
Nymphozanthos variegatus
Nymphaea odorata
Ranunculus delphinifolius
Callitriche heterophylla
C. palustris
Elatine minima
Ludvigia palustris
Myriophyllum scabratum
M. humile
M. tenellum
Proserpinaca palustris
Hydrocotyle umbellata
H. Canbyi
H. verticillata
Nymphoides lacunosum
Utricularia geminiscapa

Pond Margins. The margins of the fresh water ponds support, in

most cases, a rather characteristic flora, the components of which depend usually upon the nature of the shore.

Around those ponds with a pure sandy border the following plants may be listed as fairly typical:

Cyperus dentatus
Scirpus americanus
Mariscus mariscoides
Juncus pelocarpus
J. militaris
J. marginatus
Ranunculus Cymbalaria
Potentilla pacifica
Samolus floribundus
Limosella subulata
Ilysanthes inaequalis
Coreopsis rosea

Surrounding those ponds, however, which offer a peaty or boggy border, a somewhat different series may be cited as representative:

Thelypteris palustris, var. pubescens
Sagittaria latifolia
Sparganium americanum
Glyceria obtusa
G. pallida
Eleocharis acicularis
Scirpus cyperinus
Rynchospora alba
R. capitellata
Carex lurida
Eriocaulon septangulare
Xyris caroliniana
Juncus canadensis
J. acuminatus
Iris versicolor
Habenaria lacera
Drosera rotundifolia
D. intermedia
Spiraea tomentosa
Polygala cruciata
Hypericum boreale
H. virginicum
Viola lanceolata
Rhexia virginica
Scutellaria epilobiifolia
Lycopus uniflorus
Gratiola aurea
Bidens connata

It is not suggested that the two classes of plants above presented be taken as mutually exclusive. In general, however, these species exhibit a marked preference for the habitat under which they are listed.

Swamps. Swampy areas occur near some of the larger ponds, notably west of French Watering Place on Naushon and around portions of the dune ponds on Nashawena. In addition, most of the islands boast one or more swampy hollows and Naushon and Nashawena each has several rather extensive swamps in low-lying depressions near the shore. A few of the characteristic plants of this type of habitat may be noted:

Typha latifolia
Spartina Michauxiana
Phragmites communis
Dulichium arundinaceum
Scirpus validus
S. cyperinus
Juncus effusus, var. costulatus
Spiraea tomentosa
Rosa palustris
Impatiens biflora
Decodon verticillatus
Sium suave

Asclepias incarnata, var. pulchra
Lysimachia terrestris
Cephalanthus occidentalis
Eupatorium verticillatum

Bogs. In addition to the restricted boggy areas in the moist hollows and those forming pond margins, there are several rather extensive bogs of a permanent character. Chief among these may be mentioned one chain of bogs at the east end of Pasque and another series at the west end of Cuttyhunk. Many of the plants which occur around the peaty borders of the small ponds grow also in these open bogs, but certain other species reach their fullest development only in the more extensive areas. The following is but a partial list of some of the more conspicuous of these bog plants:

Woodwardia areolata
Thelypteris palustris, var. pubescens
Osmunda regalis, var. spectabilis
Lycopodium inundatum, var. Bigelovii
Panicum longifolium
Glyceria obtusa
Eriophorum virginicum
Rynchospora fusca
Carex cephalantha
C. Howei
C. canescens, var. disjuncta
C. virescens
C. limosa
Eriocaulon septangulare
Xyris caroliniana
Juncus effusus, var. costulatus
Habenaria clavellata
H. lacera
Pogonia ophioglossoides
Calopogon pulchellus
Drosera rotundifolia
D. intermedia
Rubus hispidus
Polygala cruciata
Viola lanceolata
Epilobium palustre, var. monticola
Clethra alnifolia
Rhododendron viscosum
Chamaedaphne calyculata
Vaccinium macrocarpon
Bartonia virginica
Menyanthes trifoliata, var. minor

Grassland. As already indicated, the larger part of the surface of the Elizabeth Islands is dominated by open, undulating grassland. The following list, incomplete though it is, will convey more adequately than could any description an impression of the character of these bleak grassy downs:

Dennstaedtia punctilobula
Andropogon scoparius, var. frequens
Paspalum pubescens
Panicum virgatum, var. spissum
P. depauperatum
P. Lindheimeri, var. fasciculatum
P. meridionale
P. oricola
P. sphaerocarpon
Anthoxanthum odoratum
Aristida purpurascens
Phleum pratense
Holcus lanatus
Poa pratensis
Festuca rubra
Agropyron repens
Cyperus filiculmis, var. macilentus
Carex albolutescens
C. silicea
C. Muhlenbergii

C. Swanii
C. varia
Juncus tenuis
J. Greenei
Sisyrinchium angustifolium
Spiranthes gracilis
Rumex Acetosella
Spergularia rubra
Stellaria graminea
Cerastium vulgatum
Ranunculus acris
Lepidium virginicum
Potentilla pumila
P. argentea
Trifolium arvense
Polygala polygama
Euphorbia maculata
Hypericum perforatum
Helianthemum canadense
H. dumosum
H. Bicknellii
Hudsonia tomentosa
Lechea maritima
Viola fimbriatula
Daucus Carota
Trichostema dichotomum
Linaria canadensis
Eupatorium hyssopifolium
Chrysopsis falcata
Solidago suaveolens
S. nemoralis
S. graminifolia
S. tenuifolia
Aster patens
A. linariifolius
Sericocarpus asteroides
Antennaria neglecta
Anaphalis margaritacea
Gnaphalium obtusifolium
Rudbeckia hirta
Achillea Millefolium
Chrysanthemum Leucanthemum,
var. pinnatifidum
Krigia virginica
Leontodon autumnalis
Hieracium Gronovii

Scrub Growth. Under the protected lee of the hills, in dry sheltered hollows or bordering the woods, where they form a transition zone between the grassland and the woodland, occur open patches or dense, scrubby thickets of low shrubs, of which the following may be designated as characteristic:

Myrica Gale
M. caroliniensis
Betula populifolia
Pyrus arbutifolia
Amelanchier oblongifolia
Rubus Andrewsianus
Rosa virginica
Prunus serotina
P. maritima
Rhus copallina
Ilex verticillata
Clethra alnifolia
Rhododendron viscosum
Leucothoe racemosa
Lyonia ligustrina
Gaylussacia frondosa
G. baccata
Vaccinium corymbosum
V. atrococcum
Viburnum dentatum

Woodland. In certain areas, especially near the center of Naushon, the native woods are made up of almost pure stands of beech, *Fagus grandifolia*. These trees grow nowhere very tall, averaging, perhaps, 30–40 feet, and their low, flat, leafy crowns meet overhead, forming a thick roof through which a subdued light filters. This climax beech forest may also be seen on a somewhat reduced scale in portions of Nonamesset and Nashawena. Usually, however, the wooded areas, although they may be dominated by beech, contain a

liberal sprinkling of certain other species, most prevalent among which are:

Ostrya virginiana
Quercus alba
Q. velutina
Hamamelis virginiana
Sassafras officinale
Acer rubrum
Nyssa sylvatica

In addition to these important constituents of the densely forested portions, a few other trees occur scattered here and there, seldom entering conspicuously into the formation of the heavy woods. As such may be named:

Pinus rigida
Chamaecyparis thyoides
Juniperus virginiana
Carya alba
Prunus serotina
Rhus Vernix
Ilex opaca
Cornus florida

Mention has already been made of the efforts which were carried on to introduce certain trees either as a windbreak or for ornamental purposes. Some of these, such as white poplar, ailanthus and catalpa, have taken hold and are spreading, while others apparently just manage to survive. A partial list of these introductions follows:

Pinus sylvestris
Larix decidua
Picea Abies
P. glauca
P. pungens
Salix alba
Populus alba
Betula pubescens
B. pendula
Gleditsia triacanthos
Robinia Pseudo-Acacia
Ailanthus glandulosa
Catalpa bignonioides

The herbaceous flora which enjoys the protection of the native woodland of the islands is for the most part a rather meagre one. The dry, leaf-covered floor of the pure beech woods is almost uniformly sterile, so far as vascular plants are concerned, although such an habitat presents a rich and varied mycological flora, especially following a heavy rain. In the more open mixed woods, however, several characteristic species inhabit the shaded knolls. As examples may be cited:

Pteridium aquilinum, var. latiusculum
Thelypteris noveboracensis
Panicum dichotomum
Carex cephalophora
Sanicula canadensis
Monotropa uniflora
Epifagus virginiana
Galium pilosum

Certain of the low depressions or hollows in the woodland areas are swampy and, in addition to high-bush blueberries (*Vaccinium corymbosum* and *V. atrococcum*), may harbor such plants as:

Sparganium eurycarpum
S. americanum
Sagittaria latifolia
Glyceria striata
Carex lupulina
Juncus effusus, var. solutus
Decodon verticillatus
Siam suave
Lycopus uniflorus
Erechtites hieracifolia

Other similar depressions are moss-covered and boggy and in such situations may be found:

Carex Howei
C. canescens, var. disjuncta
C. brunnescens, var. sphaerostachya
Arisaema triphyllum
Oakesia sessilifolia
Maianthemum canadense
Medeola virginiana
Trientalis borealis

CHANGES IN THE FLORA OF THE ELIZABETH ISLANDS

Here it is proposed to indicate the possible direction and nature of the changes in the flora of these islands. It has seemed advisable to put on record certain facts which illustrate what has already taken place in this respect and to point out others which may be of interest to the future student of the islands in interpreting further changes.

The original wooded nature of all of the Elizabeth Islands has previously been alluded to, as has also the fact that the present treeless condition of some members of the chain is apparently the direct result of cutting by man. Right here the question may very well be asked, "Why have the islands thus denuded never regained their forest growth?" In attempting to solve this problem two chief factors must be taken into account and their relative importance weighed.

In the first place, sheep have been raised more or less extensively on the islands from time to time and the effects of these browsing animals in cropping off the young vegetation must not be lost sight of. Despite the numbers and activities of the sheep, however, they have not succeeded in keeping down completely the herbaceous growth in those areas which they inhabit. Even on Nashawena, where their numbers are greatest, the open grassy downs where they graze boast a large number of species of grasses as well as other plants and one has no difficulty in collecting perfect and unmutilated specimens of any plant which he desires. While evidences of grazing are certainly not absent, the region in general does not present the devastated appearance which so often results where sheep have been allowed to run wild; and the fact that so many herbaceous and shrubby plants are able to make a showing, especially in the protected hollows, would seem to indicate

that it can scarcely have been the sheep alone which kept back the developing growth so severely that the trees were unable to regain their foothold.

The second factor which deserves serious consideration is a geologic one. In an important paper on coastal subsidence in 1893,[1] Dr. Arthur Hollick called attention to the fact, already well established, that the era of elevation which was active along the eastern borders of the North American continent in late Tertiary times resulted in an uplifted coastal plain, the eastern limits of which probably coincided with the present 100-fathom contour (about 100 miles from shore). This elevation is supposed to have reached its maximum shortly after the advent of the Ice Age. Then, either previous to, or subsequent to the period of greatest ice accumulation, an era of depression set in. The rate of subsidence has been roughly calculated and Hollick supposes that 6000 years ago the area included within the present 20-fathom line would have been dry land.

That is, not only would the Elizabeth Islands, together with Long Island, Block Island, Martha's Vineyard and Nantucket, have formed a portion of a continuous land surface, but they would have been some miles inland from the actual coast line. The nearest approach of the 20-fathom line to Cuttyhunk is at a point almost due south, where it is now about 20 miles (32 kilometers) out from the shore. To the southeast this distance increases to about 90 miles (146 kilometers) as the submerged contour swings out to sea to conform roughly to the outlines of Nantucket.

The part which this post-Pleistocene land shelf may have played in the migration of plants to the Elizabeth Islands will be a matter for consideration in the section of the Origin of the Flora which follows. The point requiring present emphasis is this: if all the islands were heavily wooded at a time when perhaps their inland location afforded them some protection, it seems highly probable that later, when they assumed their present position, the severe maritime conditions then prevailing would be such as to discourage nature's attempts at reforestation, once the original woodland were removed. This would suggest that those islands which have never been disturbed, such as Naushon, have merely retained an original forest growth, the possession of which they owe to conditions previously more advantageous

[1] Hollick, A. Plant Distribution as a Factor in the Interpretation of Geological Phenomena, with Special Reference to Long Island and Vicinity. Trans. New York Acad. Sci. xii. 189–202 (1893).

than obtain at present, while those less fortunate have suffered through their comparatively recent exposure to the unmitigated forces of the Atlantic. That excessively high wind velocity is an effective factor in retarding tree growth is nowhere better shown than on the eastern side of Nantucket with its extensive scrub oak barrens. This is further borne out on the Elizabeths by the fact that in the open, unprotected areas scrub growth forms only in the more or less sheltered hollows and the occasional isolated sapling which does get a start elsewhere remains dwarfed and stunted.

It is true that on Martha's Vineyard the woods along certain sections of the north shore have been cut for their timber more than once, and that new growth has been quickly made. But this slope enjoys the protection of the high line of morainal hills, averaging 200–300 feet, which shelter it from the winds of the open sea. No such protection exists on the Elizabeth Islands and the lack of it, rather than the presence of sheep, appears to be the determining factor in the failure of natural reforestation. In the light of these facts, it would seem futile to hope that the devastated areas can ever regain their former wooded luxuriance.

Another phase of vegetational change which it seems worth while putting on record is the behavior of certain introduced species on the Elizabeth Islands.

Reference has already been made to the planting of Scotch Broom, *Cytisus scoparius*, on Naushon. It is interesting to note that, in the account of his reconnaissance made between August 10 and 16, 1898, Dr. Hollick says of this species that it was "planted over extensive areas" on Naushon but that it "did not appear to be in a very thriving condition."[1] Today *Cytisus* occupies solidly an area of many acres along the north shore of the island, near Kettle Cove. On the 10th of August, 1927, Professor Fernald and the writer visited this locality and had the unique experience of wandering through this exotic plantation. The plants grow very close together, and are often 6–8 feet tall, and the tendency in attempting to traverse the area is to lose completely one's sense of direction. Unless checked in some way, *Cytisus* bids fair to encroach even further upon the surrounding region and to usurp in time a much larger area than that which it now dominates. Although introduced also on Pasque and Nashawena, Scotch Broom has nowhere else made the showing that it has upon Naushon.

[1] Hollick, A. Cont. Geol. Dept. Columbia Univ. xi. no. 72. 391 (1901).

Another leguminous plant that has been successful in establishing itself is the Woad-waxen, *Genista tinctoria*. This species was introduced at the extreme east end of Naushon, near Hadley Harbor. It now occupies almost solidly a large field in this vicinity and occurs scattered elsewhere over the open hillsides here as well as on Uncatena.

At several places the Tree of Heaven, *Ailanthus glandulosa*, has become thoroughly naturalized and appears to be spreading rapidly. This is especially true on Naushon, north of Tarpaulin Cove, where, in at least one protected hollow, this tree has formed an extensive and almost impenetrable thicket.

There remains to be considered in this connection such light as is thrown on the nature of vegetational changes by an examination of David Starr Jordan's account of the flora of Penikese as he found it in 1873.[1] The author states it as his hope that his list may have an interest for future botanists, especially "as showing which plants survive a prolonged struggle for existence against grass and sheep." And as this is the first published list of the flora of any of the Elizabeth Islands, it forms our chief basis for a study of those changes which may have occurred over a considerable period of years.

In the paper entitled "The Flora of Penikese, Fifty Years After," which has already been mentioned, Dr. I. F. Lewis summarizes the numerical differences berween Jordan's list and that compiled as the result of the survey made in 1923.[2] It is not intended to duplicate that summary here, but subsequent exploration by the present writer has yielded so many additional records, and a closer scrutiny of the terminology employed in the earlier list has resulted in a so much better understanding of the discrepancies involved, that it seems well to consider, as briefly as possible, just how much significance, if any, attaches to the marked difference in the superficial aspects of the two lists.

The list for 1873, compiled by Dr. Jordan, contains 1 fern and 113 flowering plants, whereas the present list includes 3 ferns, 1 gymnosperm (introduced) and 178 flowering plants. Of the 114 species of vascular plants tabulated by Jordan for Penikese, including Gull Island, a considerable number (about 25) have not been found as the result of recent investigations. On the other hand, of the 182 species of vascular plants on the present list an even larger number (probably 100) were not enumerated in the earlier report.

[1] Jordan. l. c. p. 193.
[2] Lewis, I. F. Rhodora, xxvi. 188 (1924).

In comparing these two lists the necessary allowances must be made for the very natural changes in nomenclature which have come about during the intervening 55 years. Dr. Jordan states, in a letter to the writer, that the names he employed were those found in the edition of Gray's Manual then most recent (Ed. 5). With this fact in mind, it then becomes possible to reconcile a few of the disparities in the two lists. In general, these discrepancies fall roughly into three categories which may be briefly described as follows:

In the first place, there are those cases in which a difference of names involves direct synonymy. Thus, the plant listed by Jordan as *Dicksonia punctilobula* Kunze is surely the same as that which we are today calling *Dennstaedtia punctilobula* (Michx.) Moore. Similarly, his *Panicum Crusgalli* L. corresponds to our *Echinochloa Crusgalli* (L.) Beauv., his *Triticum repens* L. to our *Agropyron repens* (L.) Beauv., his *Scirpus pungens* Vahl. to our *S. americanus* Pers., his *Maruta Cotula* DC. to our *Anthemis Cotula* L., and so on.

The second class of discrepancies includes cases involving mistaken identity or in which an older species has become recognized as consisting of two or more separate and distinct entities. For example, *Calamagrostis arenaria* Roth of Jordan's list is certainly the plant known today as *Ammophila breviligulata* Fernald. This is not at all a case of direct synonymy, but merely an instance where an American plant, as beautifully pointed out by Fernald, has proved upon study to be entirely distinct from its Old World ally. Again, Jordan's *Spartina stricta* Roth is doubtless our *S. alterniflora* Loisel. var. *pilosa* (Merrill) Fernald, his *Scirpus maritimus* L. our *S. campestris* Britton, var. *paludosus* (A. Nels.) Fernald, his *Sisyrinchium Bermudiana* L. our *S. angustifolium* Mill. *Spergularia salina* Presl, of Jordan's list, appears not to grow on Penikese at the present time, but *S. leiosperma* (Kindb.) F. Schmidt is fairly common and we are presumably warranted in applying a modern interpretation to the older name. Comparable to this are *Cerastium viscosum* L. for which we find only *C. vulgatum* L., *Viola sagittata* Ait., which is represented only by *V. fimbriatula* Sm., *Scutellaria galericulata* L. which is replaced by *S. epilobiifolia* Hamilton, and a host of similar cases. In all such instances, then, we are probably justified in assuming that a plant bearing an unallowable name on the early list is represented today by the name of a recently recognized segregate or a closely related species, rather that that it has actually disappeared from the flora.

Finally, there are several plants on the Jordan list concerning the identity of which, in the complete absence of herbarium material, it is futile even to hazard a guess. *Panicum dichotomum* L., for example, which so far has not been collected, may ultimately be found still growing on the island, or, since that name was applied in a very broad sense in 1873, Dr. Jordan may really have had reference to *P. oricola*, *P. meridionale*, *P. Lindheimeri*, var. *fasciculatum* or to something still different not yet reported from the island. Likewise, *Carex straminea* Schkuhr, a name used loosely before this group had received critical study, may be equivalent to either *C. Longii*, *C. hormathodes* or *C. silicea* or to all three. And again *Polygonum Hydropiper* L., not known from Penikese today, may equal *P. punctatum* Ell., which is ubiquitous, or some other species not yet found. Through the unfortunate lack of preserved vouchers, therefore, all such ambiguous references, when uncorroborated by subsequent collections, must be discredited.

After having made all due allowances, however, for inequalities arising from synonymy, modern revisions and ambiguous records, there still remain slightly more than a score of plants of the 1873 list which recent searches have failed to reveal. Most of these are species which occur on the other islands and their absence from Penikese may be merely an apparent one, to be remedied by further scrutiny. As such may be mentioned: *Poa annua*, *Juncus pelocarpus*, *Atriplex arenaria*, *Salsola Kali*, *Euphorbia polygonifolia*, *E. maculata*, *Hypericum mutilum*, and *Asclepias incarnata*, var. *pulchra*. With the exception of the last two species named, which may have disappeared as the result of gradual drying up of the ponds, there is every reason to expect that these plants will some time be collected on the island. A few others, such as *Ruppia maritima*, *Salicornia europaea* (*S. herbacea*) and *Suaeda maritima*, are plants of brackish situations and their absence is confirmed by independent observations on the tendency of the two saline areas on the island to become overgrown and to lose their brackish character. Even during the six years from 1923 to 1928, South Pond has become distinctly less brackish, both as to the nature of its margin and its algal flora. The same can apparently be said for the ponds on the peninsula, and while these may be merely local and transitory phenomena, they suggest the gradual diminution of brackish areas formerly more extensive, a change worth noting. Three of Jordan's plants which were listed from Gull Island only,

namely, *Rhus Toxicodendron, Coelopleurum lucidum* (*Archangelica Gmelini*) and *Limonium carolinianum* (*Statice Limonium*), are not only still missing from Penikese, but have completely disappeared from Gull Island as well. The total absence of Poison Ivy from Penikese, in the face of vigorous and repeated search for it, is one of the queer and not altogether unpleasant surprises of this island. Finally, Jordan lists three plants which are not only unknown from Penikese but, so far, have been collected on none of the other Elizabeth Islands: these are *Puccinellia* (*Glyceria*) *maritima*, *Salix discolor*, and *Iva oraria* (*I. frutescens*). The first of these may well refer to *P. paupercula*, var. *alaskana*, known only from Cuttyhunk, the next might easily have been an introduction which had died out, and *Iva* probably is another of the diminishing salt marsh tribe, a species which it would be interesting to add to the list of Elizabeth Islands plants.

Turning now to the modern list of the flora of the island, we find, after again making the necessary correction for synonymy, errors, etc., that of the 182 species of vascular plants which it includes, at least 96 (53)% can not in any way be identified with anything on the earlier list. This large number of species not seen or listed by Dr. Jordan can conveniently be divided into three groups, as follows: (1) Garden escapes, about 20 species; (2) Cosmopolitan adventives, about 20 species; (3) Native plants, over 50 species.

Garden escapes. This includes a few ornamentals which may well have been planted during the days of the leper occupation, some of which have spread, while others have just barely managed to persist; a few have escaped from the cultivated area near the site of the old laboratory building which was destroyed by fire in 1896. A partial list includes:

Lilium tigrinum
Asparagus officinalis
Gysophila paniculata
Dianthus barbatus
Rubus laciniatus
Rosa rugosa
Oenothera grandiflora
Ligustrum vulgare
Digitalis purpurea
Lonicera japonica
Helianthus annuus
Coreopsis lanceolata

Here also, since this is a class of plants the introduction of which would appear to have been premeditated, should be mentioned a few trees which were set out around the dwelling of the resident physician, namely:

Pinus sylvestris
Salix pentandra
S. alba
Populus alba
Acer Pseudo-Platanus
A. platanoides

Cosmopolitan adventives. These are the ever present European introductions which occur more or less commonly in dry sterile soils and cleared ground, especially near the haunts of man. It is rather surprising that so many plants of this class should be lacking from Jordan's list, but they have probably been brought in with fodder, building materials and other supplies. A few of these may be cited:

Avena sativa
Dactylis glomerata
Bromus secalinus
B. hordeaceus
Carex contigua
Polygonum Convolvulus
Stellaria graminea
Sisymbrium altissimum
Ranunculus acris
Trifolium pratense
Hypericum perforatum
Daucus Carota
Convolvulus arvensis
Linaria vulgaris
Tanacetum vulgare
Sonchus arvensis
S. oleraceus
S. asper

Native plants. As noted above, more than one-half (96 species) of the plants on the present list of the flora of Penikese appear to have reached the island since 1873. Of these 96 species, about 40 have received consideration in the two classes just dealt with; their appearance on the island since 1873 may be accounted for in the light of their being introductions, either accidental or intentional. Permitting of no such simple explanation, however, is the occurrence today on the island of more than 50 species of native plants which were not recorded as present in 1873 by Dr. Jordan. A few of these, such as *Ranunculus delphinifolius*, *Potentilla pumila*, *Callitriche heterophylla* and *Ilysanthes inaequalis*, are rather inconspicuous forms and might conceivably have been overlooked in the preparation of the original report. Others are late-blooming members of the Compositae and, as Jordan lists only one Golden-rod, *Solidago sempervirens*, and not a single Aster, it would seem that he had not remained on the island long enough to obtain a fair sample of the flora of late summer and might thus have completely missed *Solidago juncea*, *S. rugosa*, *S. nemoralis*, *S. canadensis*, *S. tenuifolia*, *Aster undulatus*, *A. multiflorus* and *A. vimineus*, all of which appear on the present list. In this group also, might be placed such things as *Gnaphalium obtusifolium*, *Rudbeckia hirta*, and *Bidens connata*, although these plants are generally recognizable by the first of August, as, indeed, are most of the Goldenrods and Asters listed above. Incapable, however, of any such interpretations as

those just offered, is the present existence on Penikese of the following plants, most of them conspicuous, some of them dominant elements of the vegetation:

Athyrium angustum
Thelypteris palustris, var. pubescens
Typha latifolia
Panicum virgatum, var. spissum
Danthonia spicata
Distichlis spicata
Scirpus validus
Carex hormathodes
C. silicea
Juncus dichotomus
J. Greenei
J. effusus, var. costulatus
J. acuminatus
J. articulatus
Smilax rotundifolia
Sisyrinchium graminoides
Myrica caroliniensis
Rumex maritimus, var. fueginus
Amelanchier oblongifolia
Rubus pergratus
Rosa palustris
Prunus serotina
Rhus typhina
Parthenocissus quinquefolia
Oenothera biennis
Ligusticum scothicum
Asclepias syriaca
Galium Claytoni
Sambucus canadensis

It is difficult to believe that all these plants could have escaped the attention of the compiler of the original list and we are rather forced to the conclusion that they have made their advent to the island since 1873. By just what means they may have made their way to Penikese and just how much significance may be attached to their occurrence there today, are matters for conjecture. Certainly they are not species preëminently adapted for wind dispersal, although *Typha* and *Asclepias* constitute exceptions to this statement, and spores of the two ferns may possibly have been transported by that agency. A few of them, such as *Scirpus validus*, *Juncus acuminatus*, *J. articulatus* and the *Rumex*, which grow in or around ponds, may have been brought in by birds, while a few others have fleshy seeds or fruits and may also have been introduced in this way. On the other hand, the presence of this large block of recent arrivals may be merely illustrative of what takes place on these islands when the practice of raising sheep is discontinued, although it is difficult at first sight to see just why these particular species should have been kept down until recent times when so many others were not only present in 1873 but have survived the "prolonged struggle for existence against grass and sheep."

(To be continued)

THE CAPE COD CEANOTHUS.—In the sandy open woods of "Middle" Cape Cod (from eastern Barnstable to Harwich and Brewster), where the characteristic flora is that of the southern Coastal Plain, the New

Jersey Tea (*Ceanthus americanus* L.) does not look like the common and typical form of the species on the mainland of New England. I first collected the Cape Cod extreme in 1919, though the late Emile F. Williams had gathered good material as early as 1896; but until now my own collections have awaited identification. Upon examination the plant of the Middle Cape seems inseparable from *C. intermedius* Pursh, Fl. Am. Sept. i. 167 (1814), described from "woods of Tennassee [Pursh consistently wrote Tennassee]. . . . Leaves not one fourth the size of the foregoing species" (*C. americanus*). *C. intermedius* is treated by Trelease as *C. americanus*, var. *intermedius* (Pursh) Trelease in Gray, Syn. Fl. N. A. i[1]. 410 (1897) with a range from South Carolina and Tennessee ("acc. to Pursh") to Florida and Louisiana, the variety having the narrower leaves very much smaller than in typical *C. americanus* and the "peduncles very slender, mostly numerous." The shrub of middle Cape Cod well matches the small-leaved southern extreme, except that its leaves are more densely pubescent and it is certainly extremely floriferous, branches appropriate for the standard herbarium-sheet showing 10–37 inflorescences. On the "Upper" Cape (in Bourne) and elsewhere about Buzzards Bay the plant is typical *C. americanus* or slightly transitional to the variety.

The following northern specimens are referred to var. *intermedius*. Massachusetts: dry ground near Pleasant Lake, Brewster, August 3, 1911, *Sinnott;* border of dry woods, Brewster, *Fernald & Long*, no. 18,731; dense shrubs 3–6 dm. high, dry pine woods and clearings, Harwich, *Fernald*, no. 18,732; sandy bluff, Centerville, July 5, 1896, *E. F. Williams*,—M. L. Fernald, Gray Herbarium.

CAREX KNIESKERNII DEWEY

J. Penteado Bill, M.D.

While botanizing along the roadside in East Hebron, New Hampshire, in the summer of 1927, the writer gathered a strange looking *Carex*. Pressure of other matters prevented comparison of it with Gray Herbarium material until considerably later, when Prof. Fernald showed that it definitely matched *Carex Knieskernii* of Dewey.

As a result of his observation that this plant occupies a poorly defined status, these notes are offered as a contribution towards its possibly acquiring a more secure position.

In looking over the literature, the treatment accorded the plant

has appeared so diverse that it has seemed worth while briefly to review it.

One reason for the indefinite status is the rarity of the plant. This paucity of material has doubtless contributed negatively to the confusion, for there are but few recorded stations, and the plant is accordingly not familiar to the rank and file of collectors.

Dewey's original description appeared in 1846.[1] In the Gray Herbarium is a sheet of Dr. Knieskern's original collection, dated 1840, at Rome, New York. The chronology of subsequent collections represented at the Gray Herbarium is as follows.

Locality	Collector	Date
1. Rome, New York	P. D. Knieskern	1840
2. Rome, New York	George Vasey	June 5, 1846
3. Oriskany, New York	H. B. Sartwell	June 22, 1846
4. Near Kakabeka Falls, Ontario	John Macoun	July 14, 1869
5. Falls, Ste. Anne des Monts, Quebec	John Macoun	Aug. 25, 1882
6. Extreme North of Minnesota	L. H. Bailey, Jr.	July 24, 1886
7. Clifton, Michigan	O. A. Farwell	Aug. 1887
8. Caribou, Maine	M. L. Fernald	July 18, 1902
	Emile Williams	
	J. F. Collins	
9. Boonville, New York	J. V. Haberer	June 11, 1914
10. Newcomb, New York	H. D. House	July 15, 1920
11. Newcomb, New York	H. D. House	June 6, 1921
12. N. fork Madeleine River, Quebec	M. L. Fernald	Aug. 12, 1923
	C. W. Dodge	
	L. B. Smith	
13. East Hebron, New Hampshire	J. P. Bill	Sept. 7, 1927
14. North Pomfret, Vermont	Miss Lillibridge	July 5, 1928

Since the writer's addition to the then existing Gray Herbarium material, a sheet has been received from the Dana S. Carpenter herbarium, representing plants collected by Miss Lillibridge in North Pomfret, Vermont, on July 5, 1928.

Carex Knieskernii did not long remain a specific entity in the literature. In Wood's *Classbook of Botany* it first appears in the second edition in 1845. Wood's description subsequently remains unchanged until the edition of 1861 when Dewey, who revised the *Carices*, added[2] "Closely related to C. Sullivantii, but differs materially when mature, in the fruit, glume and long triquetrous achenium.

[1] Amer. Jour. of Sci. and Arts, 2nd Series, Vol. II, 1846, p. 245.
[2] p. 764.

Also, by the same marks, from C. arctata Boott, to which Carey improperly (as mentioned by Boott. t., 122) refers it."

Carey, in the first four editions of Gray's *Manual*, referred the plant without comment to *C. arctata*. In 1858, Boott,[1] in his *Illustrations of the Genus Carex*, in discussing *C. Sullivantii* Boott which "Mr. Sullivant found . . . . growing with *C. pubescens* and *C. gracillima*, and thinks . . . . may prove to be a hybrid between them," said "*C. Knieskernii*, Dewey, found in Oneida County, New York, a plant only known from a few immature specimens, is closely allied to it, differing merely in a smooth and more distinctly nerved perigynium. Mr. Carey has referred it to *C. arctata*, but the pilose culm and leaves, and the copious pellucid spots on the perigynium ally it more closely to *C. Sullivantii*."

In the fifth edition of Gray's *Manual*, published in 1867, the Genus *Carex* was revised "with . . . . alterations, chiefly from the subsequent investigations of the late DR. FRANCIS BOOTT, . . . and from notes furnished by WM. BOOTT, ESQ." In it the plant is taken up as a species next to *C. Sullivantii*, and separated from *C. arctata* by key characters concurrent with the text.

The unsatisfactory status of this sedge found expression when Dr. E. C. Howe asked[2] if anyone "can . . . . forward proof that *Carex Knieskernii*, Dew., is a good species?" He mentioned Dr. Gray's comparison of it with *C. Sullivantii*, and Dr. Vasey's then belief in its identity with the European *C. sylvatica* of Hudson. He closed his query by stating "Mr. William Boott writes me that *C. Sullivantii* and *C. Knieskernii* are one and the same."

Prof. L. H. Bailey treated the plant as a separate species in his Catalogue of North American Carices in 1884. Two years later he treated it under *C. arctata*[3] as "C. ARCTATA × FORMOSA?" and adds, after quoting Knieskern's, Vasey's and Macoun's localities, "Sterile." In the same year he writes[4] "CAREX ARCTATA × FLEXILIS. . . . . In a recent trip to the northern boundary of Minnesota, I found a quantity of this rare Carex and growing in such intimate association with C. arctata and C. flexilis that all doubt was at once removed as to its parentage. I had long been confident that the plant is a hybrid, and that Carex arctata is one of its parents, but it had not occurred to

[1] Vol. I, p. 51.
[2] Bull. Torr. Club, Vol. IX, 1882, p. 35.
[3] Proc. Amer. Ac. Arts and Sci., Vol. 22, 1886, p. 104.
[4] Bot. Gaz., Vol. XI, 1886, p. 328.

me that the rare Carex flexilis is the other parent. In the Synopsis of North American Carices I guessed at Carex formosa as being the other parent, although that plant had not been found in the vicinity of Lake Superior, where Professor Macoun had found the hybrid. Dr. Vasey has loaned me the original specimens of Carex Knieskernii, together with Carex flexilis from the same source, and adds this note: 'The original Carex Knieskernii was collected by myself, in company with Dr. Knieskern, on the ground of old Fort Bull, somewhere west or northwest of Rome, N. Y., near a small stream which, if I remember correctly, was called Fish Creek, and empties into Oneida Lake. The specimens of Carex flexilis are from the same locality.' This first collection was made in 1841. In 1869 Professor Macoun collected it at Kakabeka Falls, on the Canadian side of Lake Superior. The third finding was that of the present summer, a few miles this side of the international boundary. I obtained about a hundred specimens from two or three contiguous localities. . . . . ."

Macoun in 1888 followed this view, stating[1] "I agree with Prof. Bailey in believing this is a hybrid between *C. arctata* and *C. flexilis*. Where I gathered the specimens at Kakabeka Falls, on the Kaministiqua, thirty miles from Fort Williams, Lake Superior, both of these species were found growing in profusion. Specimens of *C. flexilis*, sent from Tobique Lake, N. B., by Wetmore, contained a fine clump of *C. Knieskernii*. It is just possible that after all it is a lax form of *C. flexilis*, as it certainly approaches that species very closely."

Bailey continued to hold his hybrid diagnosis.[2] In 1893 he stated[3] "It is by no means necessary to the diagnosis of a hybrid that both parents be found in its vicinity. One parent, or even both of them, may long since have died out and the hybrid may have persisted; yet the hybrid is usually associated with its pistillate parent."

Dr. Howe in 1895 expressed[4] the same belief in the plant's identity, while a year later, Dr. Britton summed up these views[5] by stating that "**Carex Knieskerni** Dewey, is probably a hybrid with *C. castanea* or *C. formosa.*" Kükenthal in 1909 followed the generally accepted viewpoint of hybridity,[6] as did Mackenzie in 1913, though he discarded

[1] Cat. of Canadian Plants, Pt. IV, p. 162.
[2] Bailey in Gray's Manual, Ed. VI, 1889, p. 603.
[3] Bull. Torr. Club, Vol. XX, 1893, p. 419.
[4] Rept. New York State Botanist, 1895, p. 82.
[5] Ill. Flora of the U. S., 1896, I, p. 320.
[6] Engler's Pflanzenreich, IV, 20, p. 610.

C. formosa as a possibility.[1] Dr. House, however, in commenting[2] on material collected by Dr. Haberer in 1912, says "This species should, as Doctor Haberer points out in a note attached to his specimens, be restored to the company of valid species. The specimens [collected near Boonville, New York, in June, 1912] contain good achenes and no specimens of Carex arctata, with which species and Carex castanea it is suspected of being a hybrid, was growing near it. . . . Specimens of Carex are often sterile and it is possible that some of the earlier collections of this species were sterile, which led to its being regarded as a hybrid. Doctor Haberer's specimens are fertile. . . . ."

Dr. House in a later work[3] also treats the plant as a valid species.

C. castanea Wahl. (= *flexilis* Rudge) is sufficiently scarce as to be worthy of record when found. There are no sheets of New Hampshire material in either the Gray Herbarium or that of the New England Botanical Club. Further, there are no records for *C. castanea* in the local floras of Jesup for Hanover, New Hampshire (though its presence across the Connecticut River in Pomfret, Vermont, is recorded) in that of Harris for Windham, New Hampshire, Batchelder's of Manchester, New Hampshire, or in Pease's Flora of Coös County.

If *C. castanea* be one of the parents of *C. Knieskernii*, either it is yet to be discovered in New Hampshire, or it has been destroyed in the area above indicated because of some ecologically unfavorable factor.

In any event, in view of the absence of one reputed parent in the region where the writer's collection of *C. Knieskernii* was made, it would seem to him that the burden of proof of hybridity of this plant is very decidedly upon the protagonists of this theory. It would seem to the writer that his finding of the plant is but a further argument that *C. Knieskernii* is a specific entity, as Drs. House and Haberer pointed out fifteen years ago.

My grateful thanks are extended to Prof. M. L. Fernald and Mr. C. A. Weatherby for their courtesy and helpful suggestions.

WAYLAND, Massachusetts.

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[1] Mackenzie in Britton and Brown, Ill. Flora of the U. S., Ed. II, 1913, I, p. 410.
[2] Rept. State Botanist, 1913. Bull. 592, Univ. State of N. Y., 1915, p. 34.
[3] Bull. 254, New York State Museum, 1924, p. 186.

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THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

John M. Fogg, Jr.

(*Continued from page 161*)

THE ORIGIN OF THE FLORA

Any attempt to unravel the geographic origin of the chief elements comprising the flora of the Elizabeth Islands must not only concern itself with a close scrutiny of the vegetation of the immediately adjacent regions, but must also take into account supplementary evidence from two main sources, namely, the history and nature of the coastal plain and its flora, on the one hand, and the study of the morainal deposits of which most of southeastern Massachusetts is composed, on the other. In fact, so far as concerns the Elizabeth Islands, these two problems are rather inextricably linked and one can scarcely be considered independently of the other.

The Coastal Plain. Perhaps no geographic province in North America has received greater botanical attention over a long period of time than the Atlantic coastal plain. Occupying a narrow strip east or southeast of the Piedmont Plateau, from which it is more or less sharply marked off by the fall line, the coastal plain has been thought of as extending from the Gulf States and Florida northeastward through the Southern and Middle Atlantic States and reaching its northern limit in northeastern New Jersey, near the Hackensack Marshes, with a representation eastward on Staten Island, Long Island, and the immediate coast district of southeastern Massachusetts.

The surface of the coastal plain presents in general a very gentle slope to the southeast, which, in southern New Jersey for instance,

averages 5 to 6 feet per mile and is seldom over 10 to 15 feet. Eastward, beneath the waters of the Atlantic, the coastal plain continues with the same gentle slope to the 100-fathom mark, where, about 100 miles from shore, it suddenly drops off to abysmal depths. In the southern states the elevated portion of the coastal plain widens to about 150 miles, while the submarine portion dwindles, finally, off the east coast of Florida, to disappear almost entirely. Northward the submerged portion increases in width, reaching 500 miles off the coast of Newfoundland, while the subaerial portion diminishes, becoming a mere fringe of islands and the peninsula of Cape Cod, and finally disappears altogether. Throughout, the soils of the coastal plain are of a recent nature, being largely Tertiary and Quaternary, and it appears likely that the present fall line represents roughly the shore line at the end of Cretaceous time.

The flora of the coastal plain has long been recognized as distinctly southern in character, due partly to the nature of its constituent soils (for the most part, sands, clays, gravels, etc.) which have permitted a northeasterly extension of a Carolinian flora, and partly to its climate, for the temperature is appreciably milder than that of the only slightly more elevated continental mass to the westward.

In the state of New Jersey, three-fifths of which lies inside the coastal plain province, Dr. Witmer Stone recorded in 1910[1] the presence of 479 species of austro-riparian affinities, plants ranging from Florida, Georgia or the Carolinas north to southern New Jersey, some of them reaching Long Island, Massachusetts or, as we now know, even farther northward. The recorded number of such species has been materially increased by recent study.

In 1911 there appeared in RHODORA a very significant paper by Professor Fernald describing a botanical expedition to Newfoundland and southern Labrador.[2] In part II of this paper, the author discusses the Geographic Origin of the Flora of Newfoundland. Analysis of the constituent floral elements there represented reveals that 274 indigenous plants (35% of the total flora) are southwestern types and that, of these, 60 species (over 7% of the total flora) are Carolinian types, being known from southern New Jersey (or even farther southward), Long Island, southeastern Massachusetts, Nova Scotia and Newfound-

[1] Stone, W. The Plants of Southern New Jersey with Especial Reference to the Flora of the Pine Barrens. Ann. Rept. N. J. Mus. (1910).

[2] Fernald, M. L. A Botanical Expedition to Newfoundland and Southern Labrador. RHODORA, xiii. 109–162 (1911).

land, but not found inland or in continental eastern Canada. As typical of this Carolinian subclass are cited: *Schizaea pusilla*, *Ammophila breviligulata*, *Carex hormathodes*, *C. silicea*, *Corema Conradii*, *Hudsonia ericoides*, *Myriophyllum tenellum*, *Utricularia geminiscapa* and others.

In an endeavor to account for the presence in Newfoundland of this coastal plain or Carolinian element, Professor Fernald, after considering the part which may have been played by birds, ocean currents, floating ice and logs, and winds, and concluding that they are all inadequate in explaining this distribution, turns to the question of a post-glacial land bridge. Hollick's paper on this subject has already been referred to, and Professor Fernald, quick to see the phytogeographic significance of these conclusions, quotes at length from Hollick's statements and appends corroborative data from other sources.

Evidence derived from a study of the conditions attending the last, or Wisconsin, glaciation indicates that the amount of water then withdrawn from the ocean may have been sufficient, in conjunction with the tendency to uplift already noted, to leave uncovered a considerable portion of the now submerged continental shelf from the South Atlantic states to Nova Scotia and Newfoundland. Of course, as Professor R. A. Daly has recently pointed out, the apparent upward trend of the coastal shelf, resulting in part from the removal of this vast volume of water from the sea, would have been counteracted by the lowering pressure exerted by the tremendous weight of the ice on the continental mass. Nevertheless, it appears that during the Wisconsin advance, and for some time following it, a very considerable portion of the coastal bench must have been above sea level, forming, with the exception of shallow channels such as that draining the Gulf of Maine or Cabot Strait, a nearly continuous platform for the migration of plants, and animals as well, northeastward from the southern states to Nova Scotia and Newfoundland. This strip of silicious soils probably offered a nearly uniform habitat for the advance of species of austro-riparian affinities and their extension northward may even have occurred at a time when the ice had not fully retreated from the mainland of the continent.

Later, with the melting of the glacial ice and the liberation of vast quantities of water to the ocean, and perhaps through the operation of other factors as well, this continental shelf underwent a period of submergence which resulted in the drowning of this coastal plain flora except in those areas, higher than the rest and often widely separated,

which suffered no such submergence. Hence we have today in the Pine Barrens of New Jersey, on Cape Cod and the adjacent islands, in southwestern Nova Scotia and in certain parts of Newfoundland the relics of this formerly continuous flora. That these plants are nearly all species of sterile or silicious soils indicates that they were admirably adapted for migration northeastward along this post-glacial land bridge and probably explains why they have never subsequently extended their ranges to the better, richer soils immediately inland but continue to exhibit the disrupted distribution so well typified by *Schizaea pusilla* and *Corema Conradii*.[1]

In treating this subject elsewhere, Professor Fernald says, "Of greater interest are the coastal plain species, because they represent in New England, eastern Canada and Newfoundland a relic of the extensive flora which during the late Tertiary migrated northward along the then highly elevated continental shelf and at the drowning of the shelf were left as relics at isolated points. This isolated remnant of the flora derived from the southern coastal plain is represented by about 200 species north of New Jersey, and nearly every excursion to southwestern Rhode Island, Cape Cod, Plymouth County (Massachusetts), Nantucket, southern Nova Scotia, Cape Breton, eastern New Brunswick, Prince Edward Island, the Magdalen Islands or southeastern Newfoundland, adds to the number of thus isolated species known to us or extends our knowledge of those already recognized."[2]

And in 1921, in discussing the results of botanical exploration in Nova Scotia, the same author states that "if there were need of further evidence that, since the Pleistocene glaciation the continental shelf of eastern North America has been high in the air, affording an essentially continuous line of migration across the mouth of the Gulf of Maine to Nova Scotia, thence to Newfoundland, that evidence is now abundantly at hand. A striking feature of this migration northward of the southern coastal plain flora is the fact that several distinctive species or genera, *Schizaea pusilla*, *Lophiola*, *Habenaria flava*, and perhaps *Ceratiola*, reached Nova Scotia without establishing colonies on Long Island, Cape Cod or Nantucket. This would seem to indicate that the uplifted shelf was a region of some complexity or else some subtle qualities in the habitats of these plants."[3]

[1] See Fernald. l. c. Plate 90, opp. p. 140.

[2] Fernald, M. L. The Geographic Affinities of the Vascular Floras of New England, the Maritime Provinces and Newfoundland. Amer. Jour. Bot., v. 224 (1918).

[3] Fernald, M. L. The Gray Herbarium Expedition to Nova Scotia. 1920. RHODORA, xxiii. 168 (1921).

Enough has probably been said to indicate the overwhelming amount of botanical evidence in favor of a post-Pleistocene land connection permitting the northeastward extension of a southern coastal plain flora. It now becomes imperative to inquire what part this connection played in the migration of plants to the area under immediate consideration. However, before discussing the direct bearing of these findings upon the problem as presented by the Elizabeth Islands, it will be found helpful to consider what has already been learned concerning the adjacent areas, especially Nantucket, Martha's Vineyard and Cape Cod.

NANTUCKET. Nantucket, from its isolated position to the southeast, might be expected to have caught more of these coastal migrants than the areas to the west and northwest and is therefore considered first. For our modern knowledge of the flora of this island we are indebted to the discerning and painstaking researches of the late Eugene P. Bicknell, whose account of "The Ferns and Flowering Plants of Nantucket" appeared in the Bulletin of the Torrey Botanical Club from 1908 to 1919. The final section of this paper is devoted to a consideration of the origin of Nantucket's flora.[1] Omitting the hybrids, Bicknell finds upon the island 1103 [1108] species of plants of which 362 [31%] are listed as introduced and 746 as native. Of the 746 indigenous species, "over one-half [373 +] . . . may fairly be accounted as prevailingly more southern in their general distribution," while "something over 150 species . . . are at least prevailingly more northern in their general distribution."

Turning first to the plants of southern affinities, we find that over a hundred of them reach their northeastern limit of range in southeastern Massachusetts, others reach Vermont, New Hampshire or Maine, others occur in the Maritime Provinces, while a small group is found in Newfoundland. The author then gives a list of 38 plants which appear not to have been found at any more northern or eastern point than Nantucket. It is of interest to note, in passing, that only 8 of these are known from the Elizabeth Islands. More than 190 of the prevailingly southern plants occur in the Pine Barrens of New Jersey, over 300 are plants of the coastal plain elsewhere in that state, while all of Nantucket's southern-ranging maritime plants, about 40 species, also occur in New Jersey. Thus we have over 530 species [considerably more than 50%] in the Nantucket flora which display this south-

[1] Bicknell, E. P. Bull. Torrey Club, xlvi. 423 (1919.).

ern relationship. To account for this large percentage of austral forms Bicknell resorts to Fernald's views on the submerged coastal shelf and sees isolated on Nantucket the remnants of an extensive flora of southern derivation belonging to the New England seaboard of Tertiary time, "a flora lost to our later day with these broad coastal tracts which now lie beneath the sea. Yet not wholly lost. We find it still, much of it, we may believe, in the less disturbed flora of our more southern coastal plain, and we find its remnants persisting as the merest fringe along the withdrawn more northern coast-lines of the present day. And isolated on Nantucket it has been preserved to us in that assemblage of southward ranging plants, now a primary element in the general composition of the flora."[1]

Turning now to the more northern element in the Nantucket flora we find a group of over 150 species of plants. Of this number about 15 are found nowhere at a more southern point, while about 45 are near the southern limit of their coastwise range; others reach south to Long Island and a large number find their southern limit in New Jersey. In this connection it is interesting to note that of the list of 59 species given by Dr. Stone as reaching from the Maritime Provinces south to New Jersey, 18 are unknown from Nantucket. Stone's list, as it appears in his Flora of Southern New Jersey,[2] is here given. It should be observed that the terminology has been revised so as to correspond to that employed in the present Catalog of Elizabeth Islands plants. The letter "N" following the name of the plant indicates it is known fron Nantucket, "M" from Martha's Vineyard, and "E" from the Elizabeth Islands.

Isoetes Braunii N
Lycopodium inundatum
Schizaea pusilla
Potamogeton Oakesianus NME
Scheuchzeria palustris, var. americana
Triglochin maritima NME
Hierochloe odorata N
Spartina Michauxiana NME
Phalaris arundinacea
Glyceria canadensis NME
G. obtusa ME
G. grandis N
Scirpus subterminalis
S. campestris, var. paludosus NME
Eriophorum tenellum NME
E. gracile N
Carex lanuginosa NE
C. trichocarpa
C. exilis
C. livida
C. canescens, var. disjuncta NME
C. rostrata, var. utriculata N
C. limosa E
C. silicea NME
Eriocaulon septangulare NME
Juncus articulatus NME
J. pelocarpus NME
Sisyrinchium angustifolium NE
Populus tremuloides NM

[1] Bicknell. l. c. p. 434.
[2] Stone, W. l. c. p. 49.

P. grandidentata NM
Salix Bebbiana N
S. lucida
Suaeda maritima N
Chenopodium rubrum N
Arenaria lateriflora NME
Nymphozanthus variegatus NME
Actaea rubra NM
Ranunculus Cymbalaria NME
Polanisia graveolens
Rosa virginiana NME
Dalibarda repens
Geum strictum
Lathyrus maritimus NME
Geranium Robertianum
Corema Conradii NM
Hypericum boreale NME
H. ellipticum
H. Ascyron
Myriophyllum tenellum NME
Arctostaphylos uva-ursi, var. coactilis NM
Vaccinium pennsylvanicum NM
Glaux maritima N
Menyanthes trifoliata, var. minor NE
Limosella subulata NME
Utricularia intermedia N
Plantago oliganthos NME
Solidago uniligulata N
Aster nemoralis
Xanthium commune

As will be noted, of this list of essentially northern forms Nantucket has 41 representatives, Martha's Vineyard 27 and the Elizabeth Islands only 25.

Bicknell gives a list of northern plants which occur on Nantucket but are unknown from the coastal plain of New Jersey, only a few of them passing on to Long Island. The significant feature of this list in the present connection is that, although it contains 44 plants, not more than a half dozen of these are found on the Elizabeth Islands.

Mr. Bicknell endeavors to account for the presence of these northern forms, especially those of a maritime character, on Nantucket and elsewhere to the southwest by supposing that the same marginal land connection which allowed the plants of the southern coastal plain to reach Newfoundland would have permitted a counter extension of northern species to the southwest, perhaps at a later date. The author also points out that no farther away than Cape Cod there are established others of these northern species which have not reached Nantucket and likewise that Cape Cod possesses an extensive coastal plain flora which is not represented on this seaward island only a few miles to the southeast. These last two facts are significant because they apply, even in more marked degree, to the Elizabeth Islands. Not only, as indicated in speaking of the lists of northern species found on Nantucket, are many of these boreal forms lacking from the Elizabeths, but we also fail to find there that large element of southern coastal plain types which is conspicuous on Nantucket and almost dominant in certain regions on the Cape.

Martha's Vineyard. Unfortunately, far too little is known concerning the flora of Martha's Vineyard to permit of drawing any

conclusions as to the origin of the elements there represented. It is rather surprising that this relatively large and very attractive island should have escaped careful botanical treatment, but such is the case. This is not to say that no botanist has ever visited the Vineyard for the purpose of collecting specimens, for there have been over a score of independent collections made. A little more than a century ago, 1829, William Oakes visited the island and recorded some interesting finds. One of the most important collections made was that of Sydney Harris, who from 1891 to 1904, and again later in 1911 and 1914, collected many sheets, mostly from around Chilmark. The island was visited by C. A. Weatherby in 1900, by Professor Fernald in 1901, by A. H. Moore in 1904, by J. A. Cushman in 1906 and 1911, by E. P. Bicknell in 1909 (and again in 1912 and 1913), by F. W. Pennell in 1911, by Miss Magaret Heatley, (now Mrs. C. E. Moss), beginning in 1916; and all of these brought back material which has been distributed to one or more of the large herbaria of the eastern United States. Perhaps the largest collections made were those of Frank C. Seymour in 1916 and 1917; Seymour's specimens have been sent out by the Gray Herbarium. But, so far, no one has published any coherent account of the flora of the island, and New England botanists in general know less about its vegetation than about that of many a more isolated area.

The writer has undertaken to draw together in a single list all the records based upon specimens available from Martha's Vineyard. In the course of this task a systematic census was taken of the material in the New England Botanical Club and the Boston Society of Natural History. This resulted in the compilation of a list which includes about 700 plants. In an effort to supplement this knowledge two field trips were made to the island, one in August, 1927, and the other, in company with Professor Fernald, in August, 1928. From the information thus derived only one conclusion can be safely drawn, namely that from our present insufficient knowledge of the island, the surface only of which seems to have been touched, it is impossible to speak intelligently of the origin of its flora. One or two general statements, however, can probably be made with a fair degree of assurance.

In the first place, it seems evident that the long line of high hills which flanks the north shore from Menemsha to West Chop supports a flora of a northern or continental nature. Several plants were

found here, in the richer soils of the wooded slope, which are either absent from or far from common in southeastern Massachusetts, and it seems very likely that careful search will disclose many more things of this nature.

A second point which seems entitled to emphasis is, that, in general, the flora of Martha's Vineyard is far from being closely related to that of the southern coastal plain. Further study may serve to disprove this observation, but Professor Fernald and the writer, while exploring the region around Gay Head, were unable to escape the conviction that the flora dealt with was continental rather than coastal in character. Time and again the impression was borne home that the countless southern plants which form the primary element in the flora of the middle part of Cape Cod were conspicuously absent. An exception to this general statement may, perhaps, be constituted by the flora of the eastern part of the island, the region around Edgartown, where, apparently, there is a larger representation of austro-riparian types than may be met with elsewhere on the Vineyard. If these observations be justified, they will be found to fit in rather well with the interpretation of the effects of glacial activities upon the origin of the flora of southeastern Massachusetts.

Cape Cod. In speaking of the flora of Cape Cod it is necessary first to have very clearly in mind the fact that botanically, as well as geologically, this region is far from being a unit, but, rather, may be divided, more or less distinctly, into three separate provinces, which, for the sake of convenience, may be designated the "Upper," "Middle" and "Lower" Capes.

"Upper" Cape. This includes roughly Sandwich, Bourne, Mashpee, Falmouth and the western half of Barnstable. The line of morainal hills which traverses this province from north to south may be traced southwest from Woods Hole, as it is of this same ridge that the Elizabeth Islands are formed. On the mainland these hills are rather heavily wooded and the superficial aspect of this part of the Cape is that generally associated with an Alleghanian flora with a slight tinge of the Canadian. This impression is borne out by a study of the plants which occur here, many of which are either entirely lacking or only very locally known elsewhere on the Cape. There are well over 150 such plants, constituting a list too lengthy for inclusion here; the following few species may, however, be cited as typical:

Polypodium virginianum
Polystichum acrostichoides
Thelypteris Phegopteris
Osmunda Claytoniana
Botrychium virginianum
Lycopodium lucidulum
L. clavatum
Potamogeton Robbinsii
Panicum subvillosum
P. latifolium
Oryzopsis pungens
Cinna arundinacea
Glyceria grandis
G. acutiflora
Scirpus debilis
Carex tribuloides
C. scabrata
Juncus secundus
Smilax herbacea
Trillium cernuum
Habenaria dilatata
Malaxis unifolia
Betula lutea
B. papyrifera
Alnus noveboracensis
Ranunculus recurvatus
Thalictrum revolutum
Actaea rubra
Aquilegia canadensis
Chrysosplenium americanum
Potentilla tridentata
Rubus allegheniensis
Nemopanthus mucronata
Celastrus scandens
Circaea latifolia
Rhododendron canadense
Fraxinus americana
Scrophularia lanceolata
Pedicularis canadensis
Triosteum perfoliatum
Viburnum acerifolium
Lobelia inflata
Solidago ulmifolia
Aster nemoralis
A. acuminatus

Few, if any, of these plants, as will be seen, may be looked upon as species characteristic of a southern coastal plain flora.

"*Middle*" *Cape*. This province embraces the eastern part of Barnstable, all of Yarmouth, Dennis, Brewster, Harwich, and, perhaps, Chatham and Orleans. A ridge of morainal hills extending east and west along the north shore from Sandwich to Dennis, forms the "backbone" of this part of the Cape and is flanked to the south by a broad outwash plain. This area is not without its trees, but in certain parts scrub oaks predominate and the appearance of the vegetation differs strikingly from that of the inner Cape. The most salient botanical feature of this province resides in the plants of the numerous ponds and pond margins, many of which are sandy or peaty and offer an ideal habitat for an extensive flora of an austro-riparian nature. Altogether there are over 200 species which are either peculiar to this part of the Cape or which here find their greatest development, being represented only casually in the other two provinces. A partial list of these plants follows:

Thelypteris simulata
Pteridium aquilinum, var. pseudocaudatum
Potamogeton pectinatus
Sagittaria Engelmanniana
S. teres
Andropogon virginicus
Paspalum psammophilum
Panicum verrucosum
P. Bicknellii

P. microcarpon
P. annulum
P. mattamuskeetense
P. mattamuskeetense, var. Clutei
P. spretum
P. Wrightianum
P. albemarlense
P. auburne
P. Commonsianum
P. polyanthes
P. Ashei
Cenchrus pauciflorus
Spartina cynosuroides
Glyceria laxa
G. Fernaldii
Puccinellia fasciculata
E. rostellata
Psilocarya scirpoides
Scirpus Smithii, var. setosus
S. campestris, var. novae-angliae
S. Eriophorum
Fuirena squarrosa
Hemicarpha micrantha
Rynchospora Torreyana
R. capitellata, var. discutiens
Carex straminea
C. alata
C. annectens
C. laevivaginata
C. Mitchelliana
Arisaema Stewardsonii
Peltandra virginica
Juncus effusus, var. compactus
J. pervetus
J. subcaudatus
J. aristulatus
Luzula campestris, var. echinata
Lilium superbum
Lachnanthes tinctoria
Salix sericea
Myrica asplenifolia
Fagus grandifolia, var. caroliniana
Quercus stellata
Q. Margaretta
Q. prinoides, var. rufescens
Comandra umbellata
Polygonum Careyi
P. puritanorum
P. setaceum
Chenopodium leptophyllum
Acnida cannabina
Spergularia canadensis
Crataegus rotundifolia
Rubus tardatus
R. Enslenii
R. multispinus
Lespedeza Brittonii
Amphicarpa Pitcheri
Linum striatum
L. floridanum, var. intercursum
Callitriche palustris
Ilex laevigata
Ceanothus americanus, var. intermedius
Parthenocissus vitacea
Hypericum dissimulatum
Helianthemum dumosum
H. Bicknellii
H. propinquum
Viola emarginata
V. incognita, var. Forbesii
Lythrum hyssopifolium
Rhexia mariana
Epilobium molle
Oenothera linearis
O. longipedicellata
Proserpinaca intermedia
Cicuta bulbifera
Lilaeopsis chinensis
Vaccinium stamineum
Sabatia Kennedyana
S. campanulata
Apocynum medium
Cuscuta pentagona
C. compacta
Stachys hyssopifolia
Lycopus virginicus
Limosella subulata
Aureolaria pedicularia, var. caesariensis
Utricularia biflora
U. resupinata
U. subulata
Galium tinctorium
Eupatorium hyssopifolium
Mikania scandens
Chrysopsis falcata
Solidago erecta
S. puberula
S. Elliottii
Sericocarpus linifolius
Antennaria petaloidea

A. fallax
Gnaphalium obtusifolium, var. micradenium
Bidens coronata
Prenanthes serpentaria

As will be seen at a glance, the overwhelming majority of species in this list are plants of prevailingly southern affinities. Many of them are common in the Pine Barrens of New Jersey and a considerable number were not known to occur north of there, or perhaps Long Island, when the last revision was made of Gray's Manual in 1908, but have been added to the Massachusetts flora only as the result of recent investigation. The foregoing list is not in any sense an exhaustive one, nor could it hope to be, for nearly every summer's exploration adds to the already large number of southern coastal plain species which are known to occur on the central part of Cape Cod.

"Lower" Cape. At Orleans the Cape makes a right-angle turn and continues almost due north through Eastham, Wellfleet and Truro to Provincetown, which is at the extreme tip. This "forearm" or outer portion of the Cape is characterized by rather high, undulating hills, the axes of which for the most part run east and west. It is thought that the troughs between these hills may have formed the delta of a glacial river which drained into Lake Agassiz, a large body of water impounded by the ice and today represented by Cape Cod Bay. From Truro northward this part of the Cape consists of a wave-built sand spit. A few of the plants peculiar to the Outer Cape, such as *Andropogon scoparius*, var. *polyclados*, *Muhlenbergia mexicana*, *Cyperus filicinus*, var. *microdontus*, *Orontium aquaticum*, *Opuntia vulgaris*, *Aureolaria pedicularia* and *Baccharis halimifolia*, are far-ranging southern species, but the significant feature of the flora of this province is that most of its specialties are forms which display a northern or at least a continental affinity. The following are a few of the plants belonging to this category:

Potamogeton natans
Elymus arenarius, var. villosus
Scirpus atrocinctus
Eriophorum spissum
Carex Muhlenbergii, var. enervis
C. limosa
C. oligosperma
C. lasiocarpa
C. Pseudo-Cyperus
C. bullata
Juncus effusus, var. Pylaei
J. articulatus, var. obtusatus
Allium canadense
Liparis Loeselii
Salix lucida
Ranunculus sceleratus
Cardamine parviflora, var. arenicola
Pyrus melanocarpa
Potentilla tridentata
Rubus idaeus, var. strigosus
R. orarius
R. amnicola
R. recurvicaulis

R. arcuans
Prunus virginiana
P. pennsylvanica
Corema Conradii
Ilex verticillata, var. fastigiata
Hudsonia tomentosa, var. intermedia
Circaea alpina
Cornus canadensis
Arctostaphylos Uva-ursi, var. coactilis
Vaccinium pennsylvanicum, var. myrtilloides
V. Oxycoccus
Galium trifidum, var. halophilum
Linnaea borealis, var. americana
Bidens cernua
Lactuca Morssii
Hieracium marianum

Most of the species listed above are of a prevailingly northern distribution; their affinities are with the widely dispersed Canadian flora to the west and northwest. A few of them are here at, or near, the southern limit of their ranges.

Thus, it will be seen, each of the three natural divisions of Cape Cod possesses a rather distinctive flora: that of the Inner Cape is essentially of a continental Alleghanian-Canadian character; that of the Middle Cape is colored by the presence of a considerable number of Carolinian or even Louisianian types; while that of the Outer Cape is rendered striking by the occurrence of so many species of Canadian, or in some cases even Hudsonian, affinities. An attempt to explain the underlying reasons which account for this differentiation will be made in summing up the evidence for the origin of the flora of the Elizabeth Islands themselves.

Elizabeth Islands. Turning now to the region under immediate consideration, we find that the total number of species, varieties and forms of vascular plants known to occur upon the Elizabeth Islands is 686. Of these, 128 (18½%) are introduced, while 558 (81½%) may safely be classed as indigenous.

Introductions. The subject of those species of plants introduced on the Elizabeth Islands was dealt with at such length in the section on Changes in the Flora that it seems scarcely necessary to develop it further here. It need merely be pointed out that by far the larger part of these introductions is comprised of those ubiquitous European and Asiatic adventives which everywhere throughout eastern North America have taken possession of recently cleared ground or disturbed sandy areas, often completely dominating our native flora. The rest of the exotics are either garden escapes, as exemplified in the discussion of the foreign elements in the flora of Penikese, or species, such as the *Cytisus* or the various Spruces, which have been deliberately planted by man for a special purpose. A few plants

native to North America are certainly not of indigenous occurrence on the islands, but have been introduced either accidentally or intentionally. As examples of such may be mentioned *Glaucium flavum* and *Solanum triflorum*, which grow on the beach near Tarpaulin Cove, Naushon, and *Juniperus communis*, var. *depressa*, which appears to have been planted along the north shore at the west end of the same island.

(*To be continued*)

WHAT IS SCIRPUS CAPITATUS LINN?

OLIVER ATKINS FARWELL

IN RHODORA for February, 1918, pages 23 and 24, Mr. S. F. Blake attempts to show that the Linnean name should apply to what has generally been known as *Eleocharis tenuis* (Willd.) Schultes and also that *E. capitatus* (L.) R. Br. must be considered as a synonym of it.

Blake says: "The name *Eleocharis capitata* (L.) R. Br., Prod. Fl. Nov. Holl. i. 225 (1810), has a somewhat peculiar status. It was based on 'Scirpus capitatus, Linn., sp. pl. ed. Willd. 1. p. 294,' but was expressly distinguished from the Gronovian plant, which of course Brown had examined, type of *S. capitatus* L. Since however Willdenow's *S. capitatus* is based directly on Linnaeus's, the application of Brown's name must be determined by the Clayton plant on which rests the name-bringing synonym of Linnaeus. The name ELEOCHARIS CAPITATA (L.) R. Br. must therefore now be restricted to the plant which has long been called *Eleocharis tenuis* (Willd.) Schultes."

There are several errors in the above:

(1.) The Clayton plant is not the type of the species.

(2.) "(L.)" should not be placed before "R. Br.", since Brown expressly said that the Gronovian plant was not his species, but that he based his name on *S. capitatus* Willd., which are not synonymous names, Blake to the contrary, notwithstanding.

(3.) "Linn" is not the author of *Scirpus capitatus* Sp. Pl. IV. 1. p. 294, but Willdenow is.

(4.) The making of Brown's name a synonym of Schultes's name in face of Brown's express statement that they were not the same. I cannot follow the twistings and windings of a brain that will de-

liberately place a name where the original author expressly says it doesn't belong.

Blake says that the Linnean *S. capitatus* Linn is based "almost entirely on the Gronovian reference, which in turn is based on *Clayton* 380, ..." Not so!!! Linn had his own description, similar it is true, but quite distinct, and it was based, in my estimation, not on the Gronovian reference and the Clayton plant but on the only plant at that time in his herbarium, which he himself named *S. capitatus;* Blake says this plant is what is now known as *Eleocharis obtusa* (Willd.) Schultes. It fits the Linnean description quite well enough to be its type, and should be so construed. E. OBTUSA (Willd.) Schultes then becomes a synonym of *E.* **capitatus** (L.) n. comb. *Scirpus capitatus* Linn; also of Willd. p. p. *E. capitatus* (Willd.) R. Br. is a synonym of *E. caribaea* (Rottb.) Blake.

While it is true that Linn listed the description of Clayton's plant by Gronovius as a synonym, yet Linn's own description, though very similar, and his herbarium specimen from which that description was drawn should take precedence over any synonym quoted.

Willdenow's *S. capitatus*, as indicated above, not only included the Linnean species of the same name but also a West Indian species, and it was to this West Indian species that R. Br. restricted the name when he transferred it to *Eleocharis.* As pointed out by Blake, it has an older name; it occurs also in the southeastern United States.

Like Dr. Britton, I think it incredible that any author should call such a spike as is found on *E. tenuis* "subglobose," and in consequence assign it the name of *capitatus.* It seems more reasonable to believe that the original Clayton plant on which the Gronovian description was based was a plant with a subglobose spike (*E. obtusa* or even *E. capitata* as applied in our local manuals) and that the original specimen was exchanged or lost and later replaced with the plant at present in the Clayton collection. Too much reliance should not be placed upon specimens in old herbaria. It is a well known fact that such changes in the older herbaria were frequent, if not more frequent than otherwise, and if such a change occurred in the present instance, all confusion over the terms "subglobose" and "capitatus" would immediately disappear and vanish into thin air.

DEPARTMENT OF BOTANY,
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THE TYPIFICATION OF SCIRPUS CAPITATUS L.

S. F. BLAKE

MR. Oliver A. Farwell, in the preceding paper, has sought to show that I erred in transferring[1] the name *Eleocharis capitata* (L.) R. Br. to the species generally known as *Eleocharis tenuis* (Willd.) Schultes. Mr. Farwell, while admitting that the species long known as *E. capitata* must now be called *E. caribaea* (Rottb.) Blake, would typify the Linnaean name *Scirpus capitatus* by a specimen of *Eleocharis obtusa* (Willd.) Schultes collected by Kalm, which he assumes to have been the basis of the Linnaean description, and he makes what he calls the "n. comb." *E. capitatus* (L.) Farwell for the latter plant. His chief reason for so doing seems to be contained in his statement that "Linn had his own description, similar it is true [to that of Gronovius], but quite distinct, and it was based, in my estimation, not on the Gronovian reference and the Clayton plant but on the only plant at that time in his herbarium, which he himself named *S. capitatus.*"

Linnaeus' treatment of *Scirpus capitatus* (Sp. Pl. **1:** 48. 1753) is so brief that it may be reproduced once again:

5. Scirpus culmo tereti nudo setiformi, spica subglobosa.
Scirpus culmo setaceo nudo, spica subglobosa. *Gron. virg.* 12.
Habitat in Virginia.

Two features in Linnaeus' diagnosis which have made several authors[2] doubt that it could have referred to *Eleocharis tenuis*, with its 4-angled culms and slender spikelets, are the description of the culm as terete and the spikelet as subglobose. I believe that too much has been made of these supposed discrepancies. Linnaeus' diagnoses were very brief, and general terms were often used for the sake of brevity. As regards the spikelets, there is no difficulty. Examination of the material of *Eleocharis tenuis* in any large herbarium will disclose plenty of specimens, particularly those with young spikelets, in which these are broad enough to be described as subglobose. Moreover, my photograph of *Clayton* 380 in the British Museum (type specimen of *Scirpus capitatus*) shows that its spikelets are rather strongly flattened out and might easily have been so described. As regards the "terete" culms, it is easy to show that

[1] RHODORA **20**: 23–24. 1918.

[2] Britton, Torreya **19**: 246 1919; Chase in Hitchcock and Standley, Contr. U. S. Nat. Herb. **21**: 95. 1919; and now Mr. Farwell

this term was loosely used by Linnaeus. Most of his species of *Scirpus* described as possessing terete culms really have them so; but he applied the same adjective "tereti" to the culms of *Scirpus acicularis* (*Eleocharis acicularis*), which are "usually angular and sulcate,"[1] of *S. fluitans*, which are "etwas zusammengedrückt,"[2] of *S. capillaris* (*Stenophyllus capillaris*), which are strongly striate-angled, of *Schoenus mariscus* (*Mariscus serratus*), which are 3-angled above, of *Schoenus mucronatus*, which are "stumpf 3kantig,"[3] of *Eriophorum vaginatum*, which are "oben 3kantig,"[4] and of *Eriophorum virginicum*, which are trigonous above.

It is possible that Linnaeus' own diagnosis, which differs in no essential from that of Gronovius except by the introduction of the word "tereti," was based on specimens of *Eleocharis obtusa* collected by Kalm. There is, however, nothing to prove that this was the case. Mr. Farwell, apparently relying on my statement that there is a sheet of this species in the Linnaean Herbarium "collected by Kalm and known to Linnaeus before 1753," takes it as the type and interprets the name *Eleocharis capitata* accordingly. My statement that Linnaeus had seen Kalm's plant before 1753 is presumably correct, since Kalm is known to have brought his American plants to Linnaeus in 1751; but this sheet, according to the evidence available, was not in the Linnaean Herbarium in 1753! The late Dr. B. Daydon Jackson's "Index to the Linnean Herbarium" (p. 132. 1912) shows that the specimens representing *Scirpus capitatus* in the Linnaean Herbarium were not recorded in the enumeration of its contents in 1753; and Robert Brown's own note (Prodr. Fl. Nov. Holl. **1**: 225. 1810), when making the name *Elvocharis capitata*, confirms this and upsets Mr. Farwell's whole case:

> Scirpus capitatus. *Linn. sp. pl. ed. Willd.* 1. *p.* 294. (secundum synonyma Brownii et Sloanii, sed a plantâ virginianâ in Herb. Gron. diversus, haec autem, quoniam Linnaeus nullum exemplar habebat in herbario suo cum primùm Sp. pl. edidit hujus speciei unica auctoritas est).

It will be difficult to controvert Brown's statement that the Clayton plant is the sole authority for Linnaeus' *Scirpus capitatus*. Whether Linnaeus' "tereti" was based on supposition only (all the other species in that group of his genus *Scirpus* having terete culms) or

[1] Svenson, Rhodora **31**: 184. 1929.
[2] Hallier & Brand in Koch, Syn. Deutsch. & Schw. Fl. ed. 3. **3**: 2539. 1907.
[3] Hallier & Brand, l. c. 2558.
[4] Hallier & Brand, l. c. 2526.

whether it was based on some specimen, now lost or impracticable to trace, of *Eleocharis obtusa*, *E. caribaea*, or some other species, seems now impossible to establish.[1] The only plant definitely associable with his 1753 description is the specimen of *Clayton* 380 in the British Museum, and that plant is *Eleocharis tenuis* of authors.

Scirpus capitatus of Linnaeus in 1753 is, then, certainly the *Eleocharis tenuis* of modern authors, and the name *Eleocharis capitata* cannot be applied to *E. obtusa*. Is it possible to exclude the original *Scirpus capitatus* from consideration and preserve the name *Eleocharis capitata* (Willd.) R. Br. or *E. capitata* R. Br. for the plant (*E. caribaea* (Rottb.) Blake) which has passed so long under that name? Not according to modern nomenclatorial practice. If Brown had given a new specific name to the plant he described, it would have held; but as he continued the name already used by Linnaeus and Willdenow, the application of his name must be determined by the name-bringing synonym, which must be taken from one of those authors. Willdenow's description and synonymy included also the plant which has generally been known as *Eleocharis capitata* (*E. caribaea*), but his name, his first reference, and his first locality are taken from Linnaeus, so that for purposes of typification his use of the name is the same as that of Linnaeus. It may be remarked in passing that Mr. Farwell's proposal of a third usage of the name *E. capitata* as a new combination is not in accord with either of the codes of nomenclature in current use.

In conclusion, it may be pointed out that my interpretation of *Eleocharis capitata* (L.) R. Br. in the sense of *E. tenuis* (Willd.) Schultes has been followed by Fernald,[2] Merrill,[3] and Svenson;[4] and that Britton[5] and Britton and Wilson,[6] although not dealing with *E.*

[1] When Linnaeus' diagnostic phrase ("nomen specificum") differs from any synonym given, it is evidently based, in practically all cases, either on the synonyms cited or on material examined in the garden or in some herbarium. It is probable, then, that he had seen other specimens which he considered identical with Clayton's plant, which he had presumably examined when assisting Gronovius with the preparation of the "Flora Virginica." In view of Brown's very definite statement and of the record in Jackson's Index, it is obviously impossible to prove that these suppositious specimens were those from Kalm now in the Linnaean Herbarium. In 1918, with all the facts before me, I selected Clayton's plant as the type of the Linnaean name. This designation will hold unless overthrown by real evidence to the contrary, which Mr. Farwell has not produced.

[2] RHODORA **23**: 106, footnote. 1921.
[3] Enum. Phil. Flow. Pl. **1**: 119. 1923.
[4] RHODORA **31**: 128. 1929.
[5] In Abrams, Ill. Fl. Pacific States **1**: 262. 1923.
[6] Scient. Surv. Porto Rico & Virg Isl. **5** (Bot. Porto Rico & Virg. Isl.): 91. 1923.

tenuis, have adopted the name *E. caribaca* for the plant generally known as *E. capitata*.

Bureau of Plant Industry,
Washington, D. C.

Tripsacum dactyloides in Massachusetts.—Subsequent to the publication of the 7th edition of Gray's Manual, which cites Connecticut as the northeastern limit of range for *Tripsacum dactyloides* L., at least two Rhode Island stations have been discovered, one of which is in Bristol County, on the east side of Narragansett Bay. Thus it is not surprising that an extension of the range of this species into Massachusetts has been made by Mr. G. L. Stebbins at Westport Point while collecting for the New England Botanical Club during its annual field trip last September. He discovered a small colony of this curious grass in marshy ground at the top of a shingle beach within a rod or two of salt water. A specimen has been placed in the Club Herbarium.—R. J. Eaton, Cambridge, Mass.

Note on Aster amethystinus.—The article in Rhodora for January, 1930, discussing *Aster amethystinus* as an obvious hybrid, recalled my own experiences with this rare and fascinating plant. I first noted it in the northern part of Williamstown, Massachusetts, September 23, 1924. I was driving along the road parallel to the Boston & Maine railway track. A large clump in full bloom attracted me by its peculiar amethystine color, and I stopped to investigate and collect. Both *Aster novae-angliae* and *A. multiflorus*, the putative parents, were abundant close by.

Some time after I noticed in the Vermont Flora that the only authentic station for *Aster amethystinus* in that state was at South Pownal, where the plant was collected by W. W. Eggleston before 1900. I reasoned that this must be in the same general region. Accordingly, October 5, 1926, I stopped at the Williamstown station again, climbed the fence to the railway track, and followed it several rods across the state line into Vermont, till I discovered what may well have been Eggleston's original stand of the hybrid. The two parent species were scattered about in considerable profusion.

It would be a very interesting project for some botanical garden or experiment station to breed this interesting hybrid artificially for

comparison with the wild plants.—CLARENCE HINCKLEY KNOWLTON, Hingham, Massachusetts.

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THE DISTRIBUTION AND AFFINITIES OF THE VEGETATION OF THE ATHABASCA-GREAT SLAVE LAKE REGION[1]

HUGH M. RAUP

A STUDY of the flora of the Athabasca-Great Slave Lake region, in northwestern Canada, has revealed certain outstanding features of distribution and affinity. Although it is intended that a series of papers shall be prepared upon the more detailed investigations, the writer takes this opportunity to make a brief statement of the major problems involved. He wishes to express his appreciation of the valuable assistance received from Professor M. L. Fernald of Harvard University, especially in correlating the Mackenzie basin flora with that of northeastern North America. He is also much indebted to many persons in the Geological Survey at Ottawa and in the government organization at Fort Smith, North West Territories, who have helped to forward the field work.[2]

[1] Published by permission of the Director, National Museum of Canada.

[2] The writer and his wife have been engaged in botanical survey operations in the Athabasca-Great Slave Lake region during the past four summers. In 1928 and 1929 the trips were financed by the National Museum of Canada, the work being done under the general direction of Dr. M. O. Malte, Chief Botanist at the National Museum at Ottawa. In these two seasons a survey of the flora of the Wood Buffalo Park has been started. Thanks are due to the many disinterested persons who have assisted the field parties, especially to the officers of the Hudson's Bay Company, who have been unfailing in their efforts to facilitate outfitting and transportation. The party in 1926 included three students, Harold Stallsmith, Orville Myers, and E. J. Kunde, while that in 1927 included Miss Catherine Raup, and Mr. R. L. Fricke, a taxidermist from the Carnegie Museum, Pittsburgh, Pa., who made a collection of birds and small mammals. In the Wood Buffalo Park the wardens have served as guides and assistants. Mrs. Raup has looked after the most of cryptogamic collections, while the writer has collected the ferns and flowering plants.

The following is an outline of itineraries for the field seasons. (C) indicates that collections and studies of local distribution problems were made at the places where it appears in the list. Modes of conveyance are indicated by: (St)—steamer or motor tug, (Ca)—canoe, (H)—pack horse, (W)—wagon or buckboard, (P)—back packing.

A section of the vegetation reaching from the Slave River westward to Moose Lake, about 75 miles away, shows a variety of types, ranging from the flood plain sloughs of the lowlands to the prairies and thick timber on the higher ground. An examination of the distribution of these types soon suggests a strong correlation with the topographic features of the region, and leads to an investigation of the geologic and physiographic processes which have produced this topography. Botanizing and comparing notes and collections with similar situations in other regions, one is impressed with the openness of the plant associations, and with the comparatively small number of species involved in them. The plants that are there show affinities with floras of widely spearated regions, while many of the common species of the Canadian forests elsewhere are absent or very rare in the Athabasca-Great Slave Lake district.

Topographic History of the Athabasca-Great Slave Lake Region

Athabasca and Great Slave Lakes lie in the zone of surface contact between the pre-Cambrian rocks of the "Canadian Shield" to the

---

In the four summers, approximately 4400 miles have been traveled within the region, i. e., north of Waterways, the end of steel.

1926: Left Waterways (Ca) June 30; Calumet, July 4–6 (C); mouth of Embarras channel, Athabasca delta, July 11 (C); Chipewyan, July 12–13; camp about 10 miles east of Chipewyan, north shore, Athabasca Lake, July 14 (C-lichens); Shelter Point, July 14–Aug. 4 (C); left Chipewyan Aug. 7 (St); Fitzgerald, July 8 (C); arrived Waterways, Aug. 12.

1927: Left Waterways June 1 (St); left Chipewyan (Ca) June 6; Quatre Fourches channel, Peace delta, June 7 and 9 (C); 30th base line, Slave River, June 10–20 (C); Ft. Smith, June 22–28 (C); Resolution, July 2–5; Keith Island, East arm of Great Slave Lake, July 7 (C); Taltheilei Narrows, July 8–11 (C); Fairchild Pt. and vicinity, July 12–Aug. 20 (C); Maufelly Pt., July 15 (C); Fort Reliance, Aug. 7 (C); left Fairchild Pt., (St) Aug. 20; Yellowknife Bay, Aug. 23 (C); Rae, Aug. 24; arrived Waterways, Sept. 1.

1928: Left Waterways (St) June 6 (C); left Ft. Smith, June 14 (W); Smith to Pine Lake, June 14–17 (C); Pine Lake and vicinity, June 17–July 12 (C); trip to Lane Lake (Ca), June 26 (C); Pine Lake to Peace Pt. (H), July 12–15 (C-Round Lake, July 14); Peace Pt., July 15–22 (C); Peace Pt. to slough country along upper Murdock Creek, July 22–26 (Ca); Murdock Creek, July 26–29 (C); Government Hay camp, Slave River, July 29–Aug. 16 (C); Hay camp to Fitzgerald via the prairies along Salt River (H), Aug. 16–22 (C-prairies, Aug. 19–20); arrived Waterways, Aug. 30.

1929: Left Waterways (St), June 5; left Ft. Smith (Ca), June 12; portage, Salt River village to Little Buffalo River (W), June 13; started up Little Buffalo (Ca), June 15; falls of Little Buffalo, June 18–24; passed winter trail to Sucker Creek July 2, and Nini-sheth Hills July 7–8; Moose Lake, July 12–17 (C); Moose Lake to Pine Lake (P), July 17–20; Pine Lake, July 20–Aug. 1 (C); Pine Lake to Moose Lake, Aug. 1–4 (H); Moose Lake, Aug. 4–19 (C); Moose Lake to Government Hay camp (H), Aug. 19–26; arrived Ft. Smith, Aug. 27, and Waterways, Sept. 4.

Fig. 1 is a map showing the localities mentioned in this paper.

eastward, and the later, Paleozoic rocks of the main part of the Mackenzie basin. Paleozoic limestones are exposed along the Slave

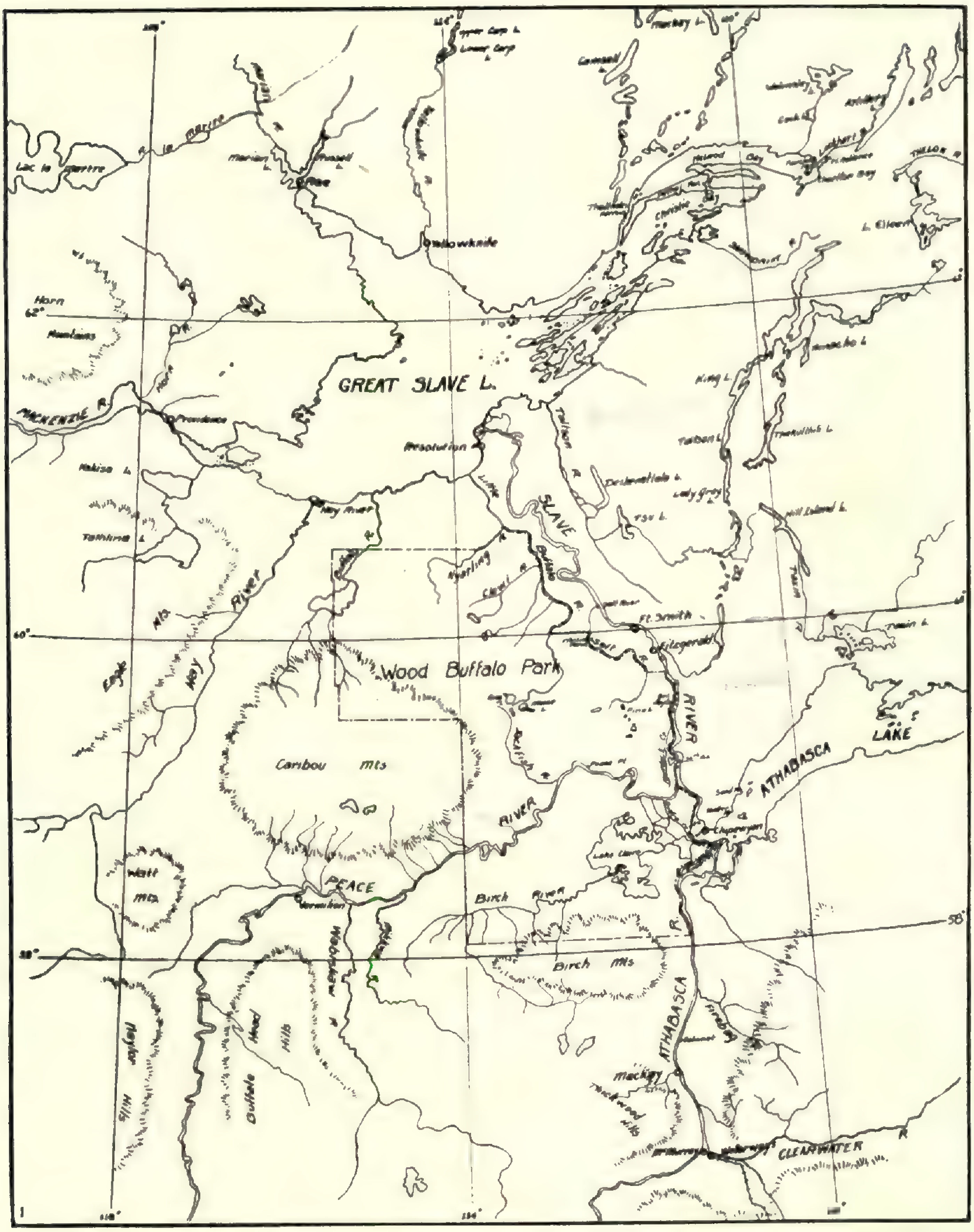


Fig. 1. Map of the Athabasca-Great Slave Lake Region

River about fifty miles below Athabasca Lake, along the lower Peace River, in the lower valley of the Athabasca River, and about the western arm of Great Slave Lake. Cretaceous strata overly the

Paleozoic rocks in the Clearwater River district on the Athabasca, about one hundred and fifty miles south of Athabasca Lake.

Lake Athabasca lies almost wholly within the pre-Cambrian rocks, as does the eastern arm of Great Slave Lake. The northern arm of the latter is on the contact, having its east shore of granites and gneisses, and its west shore of Paleozoic sediments. The broad, western arm of Great Slave Lake lies on Paleozoic rocks.

The Slave River follows the contact roughly, and the isolated granite hills along its upper course are western outliers of the pre-Cambrian mass. A western extension of the older rocks in the vicinity of Ft. Smith and Ft. Fitzgerald, about one hundred miles below Athabasca Lake, forms unnavigable rapids in the river, and is the only hindrance to navigation by steamer between Ft. McMurray and the Mackenzie delta. These granitic outliners, rising like islands out of the modern alluvial deposits, are also surrounded at their bases by Paleozoic sediments, indicating their probable, similar position relative to the seas which invaded the continent in those times.

The pre-Cambrian rocks consist largely of granites and gneisses, although there are isolated masses of highly altered, more ancient sediments and basic intrusives. South of Lake Athabasca there are extensive sandstone deposits which are referred to the pre-Cambrian, though they are not certainly correlated. These later sediments are very little disturbed.

The Cambrian, Devonian, and Silurian periods were marked by the invasion of the Mackenzie basin district by epi-continental seas, whose eastern shores followed, in general, the present contact line with the pre-Cambrian. The Cambrian is not exposed in the Athabasca-Great Slave Lake district, appearing only in the Mackenzie valley, farther northward.[1] Silurian and Devonian strata are the underlying rocks in the region under consideration, and are exposed at several places on the Athabasca, Peace, and Slave Rivers, about the western arm of Great Slave Lake, and in the region southwest of Ft. Smith.[2] The outcrops follow, in general, bands of country extending

[1] Williams, M. Y. *Reconnaissance Across Northeastern British Columbia and the Geology of the Northern Extension of the Franklin Mountains, N. W. T.* C. G. S. Summary Rept. (1922) Part B. 65–87.

[2] Camsell, Charles, and Malcolm, Wyatt. *The Mackenzie River Basin* (Revised Edition). Memoir 108, C. G. S., Geological Series No. 92 (1921). (This paper gives an admirable summary of the geology, topography, and natural history of the region so far as these were known at the time of its publication. It is also valuable for its extensive bibliography.)

in a northwest and southeast direction. They consist mainly of dolomitic limestones with an abundance of gypsum in the Silurian, and thick limestones and shales in the Devonian. Except in the Mackenzie and Franklin Mountain districts in the Mackenzie River region, the beds are very little disturbed.

Whether there are any deposits in the region between the Devonian and the Cretaceous is uncertain. No Carboniferous rocks are to be found except in the mountains west of the Mackenzie.[1] The vast deposits of the Cretaceous seas form a disconformable contact with the Devonian, but with a very slight angular unconformity, suggesting a wide-spread uplift between the Devonian and Cretaceous, and considerable erosion of the former.[2] The Cretaceous sea covered practically all of the present Mackenzie drainage basin, and its sediments are found folded into the mountains to the westward. Throughout most of the basin its beds of limestones, sandstones, and shales are nearly horizontal.

There is evidence that the thick Cretaceous deposits were entirely removed in some places prior to the Eocene.[3] They are entirely absent in the Athabasca-Great Slave Lake region, except in the plateaus of the southern and western section. They form great uplands on the upper Athabasca, Peace, Hay, Liard, and Peel Rivers, and are known or thought to form the outlying plateau areas represented by Birch Mountain, west of the lower Athabasca;[4] the Buffalo Head Hills, between the Peace and the Wabiskaw;[5] the Watt Mountains, between the Peace and upper Hay River;[6] the Caribou Mountains, between the lower Peace and Great Slave Lake;[6] the Eagle Mountains, west of Hay River;[7] and the Horn Mountain plateau, north of the Mackenzie River and west of Horn River.[8] The positions of these

[1] Hume, G. S. *Mackenzie River Area, District of Mackenzie, Northwest Territories.* C. G. S. Summary Rept. (1923) Part B. 11.

[2] Hume, G. S. Ibid. 11.

[3] Hume, G. S. Ibid. 12.

[4] Camsell, Charles, and Malcolm, Wyatt. Ibid. p. 68.

McConnell, R. G. *Report on a Portion of the District of Athabasca Comprising the Country between Peace River and Athabasca River North of Lesser Slave Lake.* C. G. S. Ann. Rept. v. Pt. 1, 43–44 D.

[5] McConnell, R. G. Ibid.

[6] Cameron, A. E. *Hay and Buffalo Rivers, Great Slave Lake and Adjacent Country.* C. G. S. Summary Rept. (1921), Part B. 29.

[7] Camsell, Charles, and Malcolm, Wyatt. Ibid. 67.

Cameron, A. E., *Post-Glacial Lakes in the Mackenzie River Basin, Northwest Territories, Canada.* Journ. Geol. xxx. 341 (1922).

[8] Whittaker, E. J. *Mackenzie River District between Great Slave Lake and Simpson.* C. G. S. Summary Rept. (1921), Part B. 54.

outlying plateaus, all 2000 feet or more in height, are of considerable importance in the arrangement of post-Glacial topography, as will be shown later. Cretaceous uplands are also known on Great Bear Lake.

It is thought that the main lines of the Mackenzie drainage basin were formed in very early Tertiary or late Cretaceous time,[1] and have been able to maintain themselves not only throughout minor crustal movements in later times, but also through the period of mountain-building in the Mackenzie valley, and through most of the Pleistocene.[2] The dissection has gone far below the Cretaceous, and has cut through the Devonian and Silurian, reaching into the Cambrian.

It appears, then, that the major surface features of the Mackenzie basin are formed by the extensive erosion, along old and well-established drainage lines, of the nearly horizontal sedimentary deposits of the Cretaceous and Paleozoic seas. The only notable disturbance has been in the mountain-building activities in the Rockies to the westward and in the minor folding in the Mackenzie valley. Such must have been the conditions at the opening of the Pleistocene. The only Tertiary deposits are localized on the Pembina River, in the Fort Norman district, and about the headwaters of the Peel River. The last two are referred to the Eocene on fossil evidence.[3] The nature of the fossils indicates that there was a distinctly temperate climate at the time of their deposit.

The interaction of the Cordilleran and Keewatin ice sheets in the Athabasca-Great Slave Lake region is not known. The surface materials show only the result of the Keewatin, whose ice front entered the region from the east and northeast.[4] It has been generally accepted that the ice completely covered all the uplands, although this is supported by few critical observations. From a study of moraines, elevated shore lines, and post-Glacial lake deposits, A. E. Cameron had outlined the order of events in the recession of the last ice sheet from the region. The writer's observations on the topog-

[1] Hume, G. S. Ibid. 12–13.

[2] Cameron, A. E. *Post-Glacial Lakes in the Mackenzie River Basin, Northwest Territories, Canada.* Journ. Geol. xxx. (1922).

[3] McConnell, R. G. *Report on an Exploration in the Yukon and Mackenzie Basins.* C. G. S. Ann. Rept. iv. 22–23 D. (1888–89).

[4] Tyrrell, J. B. assisted by Dowling, D. B. *Report on the Country between Athabasca Lake and Churchill River with Notes on Two Routes Traveled between the Churchill and Saskatchewan Rivers.* C. G. S. Ann. Rept. viii. Part D. (1896).

Cameron, A. E., Ibid.

raphy and plant cover have tended to bear out this outline. Cameron's work will be briefly summarized here.

The glacier, entering the basin by way of drainage lines which had probably been long established in the eroded pre-Cambrian plateau to the eastward, crossed the valley of the present Slave River and sent tongues into the Cretaceous uplands by way of the ancient valleys. Hence there were lobes up the Athabasca, Wabiskaw, Peace, and Hay and Buffalo Rivers, and a lobe into the upper Mackenzie valley. It appears that these lobes were effectually kept apart by the uplands of the Buffalo Head Hills, and Birch, Watt, Caribou, and Eagle Mountains. The waters of the main streams were impounded against the ice front, forming glacial lakes, whose outlets were probably toward Hudson Bay, since the normal route to the Mackenzie valley was probably blocked by ice. The lobes apparently did not recede at a uniform rate, so that a series of lakes was formed in the river valleys and in the newly deepened depressions of Athabasca and Great Slave Lakes.[1] While the ice covered the main part of the area, and extended far up the river valleys, a lake occupied the upper Hay River district, west of the Caribou plateau, and extended southward and eastward in the valleys of the Peace, Wabiskaw, and Athabasca. The plain of the bottom of this lake is found at about the 1600-foot contour line. (See Fig. 2). The next lake stage was formed when the ice had retreated many miles to the eastward. Less well-defined lobes still covered the head of the Mackenzie, the lower reaches of the Hay, and the eastern half of the present Athabasca Lake. A great lobe still occupied most of the upper Slave River valley. The Caribou mountains formed a peninsula in this lake, separating large bays which lay in the valleys of the Hay and Peace Rivers. A third bay extended up the Athabasca 100 miles or more. Drainage was probably still accomplished by valleys to the southeastward. The plain of this lake bottom may be identified, approximately, with the 1100-foot contour line (see Fig. 3).

A third lake expansion occurred when the ice covered only the eastern part of Great Slave Lake. It is probable that the Mackenzie was opened at about this time, and that the eastern drainage was discontinued. There were two main basins, one in the Athabasca

[1] On the origin of the Athabasca and Great Slave Lake basins see:
Cameron, A. E. Ibid.
Alcock, F. J. *The Origin of Lake Athabasca.* Geographical Rev. x. 44 (1920).
Tyrrell, J. B. assisted by Dowling, D. B. Ibid.

River and Lake—lower Peace area, and the other in the Great Slave Lake area. The latter had its southwestern shore line extending from the head of the Mackenzie southeastward to an area south of Buffalo Lake, and thence eastward. West of the Slave River the shore lay

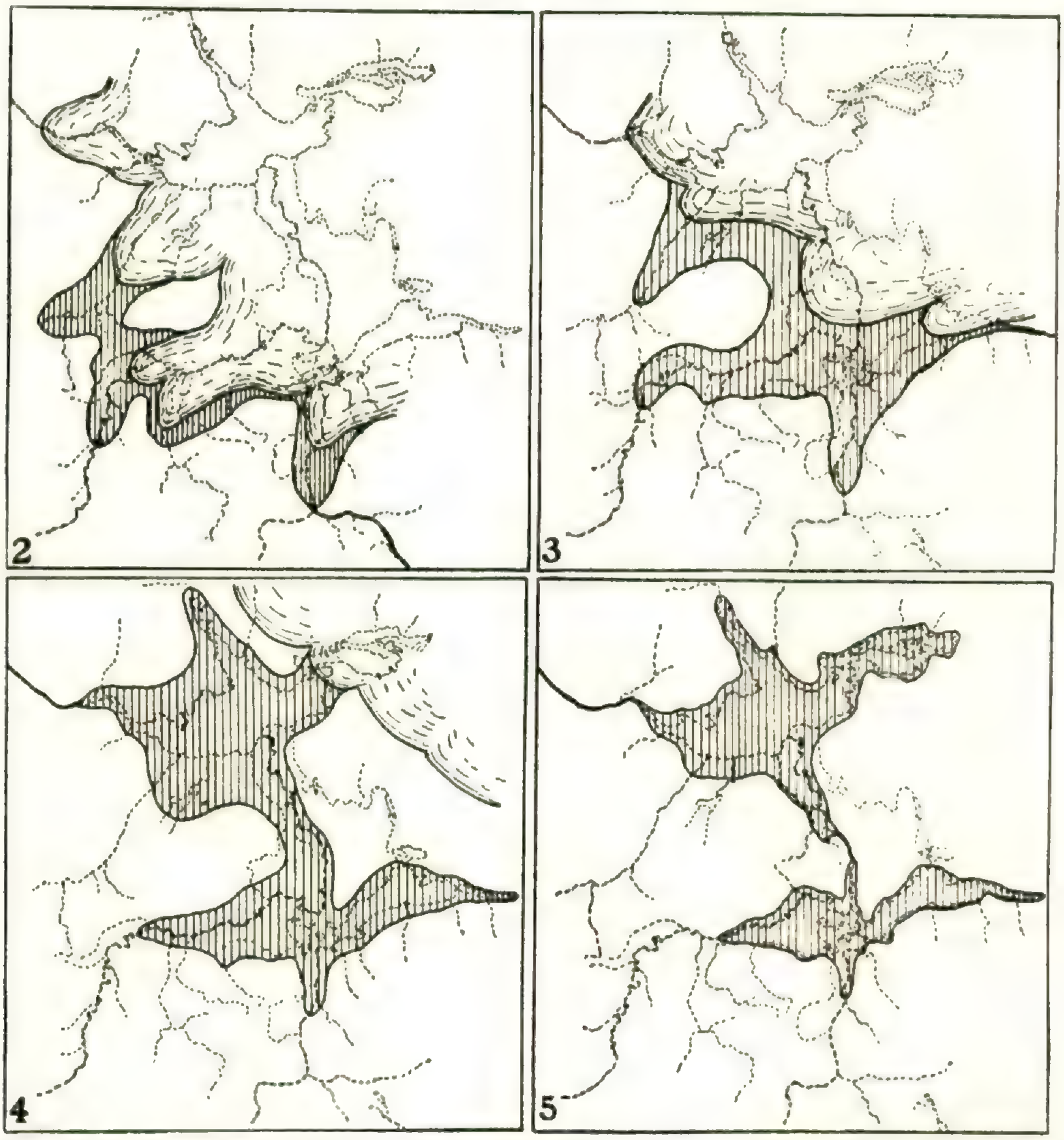


Fig. 2–5. Post-Glacial lake expansions in the Athabasca-Great Slave Lake region when the water, impounded against the retreating front of the Keewatin ice sheet, stood at about the 1600-foot level (2), the 1100-foot level (3), the 800-foot level (4), and the 700-foot level (5). (Reproduced by permission of *A. E. Cameron*.)

approximately at the limestone escarpment which forms the northern margin of the Alberta Plateau, known locally as Salt Mountain.[1] East of Slave River the shore was at the margin of the pre-Cambrian shield. Thus the two basins were united, and stood at what is now about the 800-foot level (see Fig. 4).

[1] Camsell, Charles and Malcolm, Wyatt. Ibid. 17–18.

At the 700-foot level (see Fig. 5) the two basins were separated except for the connecting Slave River. Great Slave Lake was still much enlarged, having a long southern arm which extended to about the present position of Ft. Smith, on the Slave River. The Athabasca Lake basin still had a long extension westward up the Peace, with minor ones in the Athabasca and upper Slave River valleys. These lakes stood only a few feet above the present lake levels, the modern land and water relations having been acquired by further drainage, probably due to the tilting of the basins, and by the formation of wide alluvial deposits where the main streams enter the settling basins. The Peace and Athabasca have so filled the western extension of Athabasca Lake that the only remaining water is in the shallow Lake Claire and in the neighboring smaller lakes. Slave River meanders a total distance of about two hundred miles below Ft. Smith, through the silts with which it has filled the southern arm of Great Slave Lake.[1] With the formation of natural levees in these deposits, and the wandering of the streams, there have arisen extensive, ponded, abandoned channels.

Below the heights of the Cretaceous erosion plateaus there has come, then, a varied topography, consisting of morainic uplands, level bottoms of extinct post-Glacial lakes, and modern alluvial flats. The lowering of water in the larger lake basins appears still to be in progress, as shown by the writer's studies on the shore lines of Athabasca and Great Slave Lakes.[2] The drainage of smaller basins, such as that of the morainically dammed Moose and Bog Lakes, is also still in progress, by the further cutting of their barriers.

The Distribution of the Vegetation

The country south and west of Fort Smith, and the lowland areas of the lower Athabasca and Peace Rivers are sufficiently well known for the construction of a generalized map of their vegetations (Fig. 8). In addition to his own observations the writer has drawn from those of several keen observers. Charles Camsell, in 1902, made reconnaissance journeys between Ft. Smith and the Peace River by way of the Little Buffalo and Jackfish Rivers, and between Ft. Smith and Moose

[1] Kindle, E. M. *Notes on Sedimentation in the Mackenzie Basin.* Journ. Geol. xxvi. 341–360 (1918).

[2] Raup, Hugh M. *The Vegetation of the Fort Reliance Sand Plain*, and *A Survey of the Vegetation of Shelter Point, Athabasca Lake.* Univ. of Pittsburgh Bull. xxv. 75–83 (Oct. 25, 1928).

Lake by an overland route.[1] His description of the country is excellent. E. T. Seton and E. A. Preble visited the salt plains and upland southwest of Ft. Smith in 1907, in search of the wood bison, and Mr. Seton's report contains a brief description of the country.[2] For a number of years prior to 1922, Mr. F. V. Seibert made a series of journeys over a large part of the country west of the Slave and Little Buffalo Rivers, between the Peace and the Nyarling. His map and description of the area have been very useful.[3] Later maps made by the Topographical Survey of Canada, especially the aerial photographic ones which cover a part of the region, have added much information which would be obtainable in no other way.

The arrangement of the main boundaries of the types of vegetation in the area thus far examined shows a striking similarity to that of the shores and bottoms of the post-Glacial Lakes (See Figures 6, 7, and 8).

The heavily timbered areas are confined to the upland which stood above the 800-foot lake. The timber is best developed upon the rolling morainic areas whose soils are largely sandy and gravelly, well drained. In the northeastern section of this upland heavier soils occur, with a large amount of clay. On this there is an abundance of prairie openings. The dry ridges have a forest of *Pinus Banksiana*, with a lichen and trailing shrub mat. Where the soils are not so completely drained, as on lower slopes or in hollows, a *Picea canadensis* timber has arisen, with a moss and humus mat and a light shrub cover. Extensive burning has introduced much deciduous timber of *Populus tremuloides* and *P. balsamifera*, and a rich growth of shrubs and perennial herbs. Prairie openings are margined by willows and have a close turf of short grasses mixed with other prairie herbs.

The upland vegetation is varied by muskeg forest and slough where the drainage of depressions has not been good. *Picea mariana* and *Larix laricina* are the prevailing trees at muskeg margins, while *Betula glandulosa* and various willows make up a shrub zone. Much of the country is underlain by a gypsiferous, Silurian limestone, which has brought about extensive sink hole formation. Completely

[1] Camsell, Charles. *The Region Southwest of Fort Smith, Slave River, N. W. T.* C. G. S. Ann. Rept. xv. 115A.

[2] Seton, E. T. *The Arctic Prairies.* New York, Charles Scribner's Sons (1911).

[3] Seibert, F. V. *Map Showing the Interior Topography of the Wood Buffalo Park.* Natural Resources Intelligence Service, Dept. of Interior, Canada.

———, —. —. *Canada's Wild Buffalo*, Appendix, *A Reconnaissance Survey in the Home of the Wood Buffalo.* Dept. of Interior, Canada, Northwest Territories and Yukon Branch (1922).

undrained holes have permanent lakes or bogs in them, while completely drained ones have a vegetation similar to their surroundings.

Figs. 6 and 7. Probable lake expansions in the lower Athabasca-lower Peace-upper Slave River district when the water stood at the 800-foot (6) and 700-foot (7) levels. (Modified from *A. E. Cameron*.)

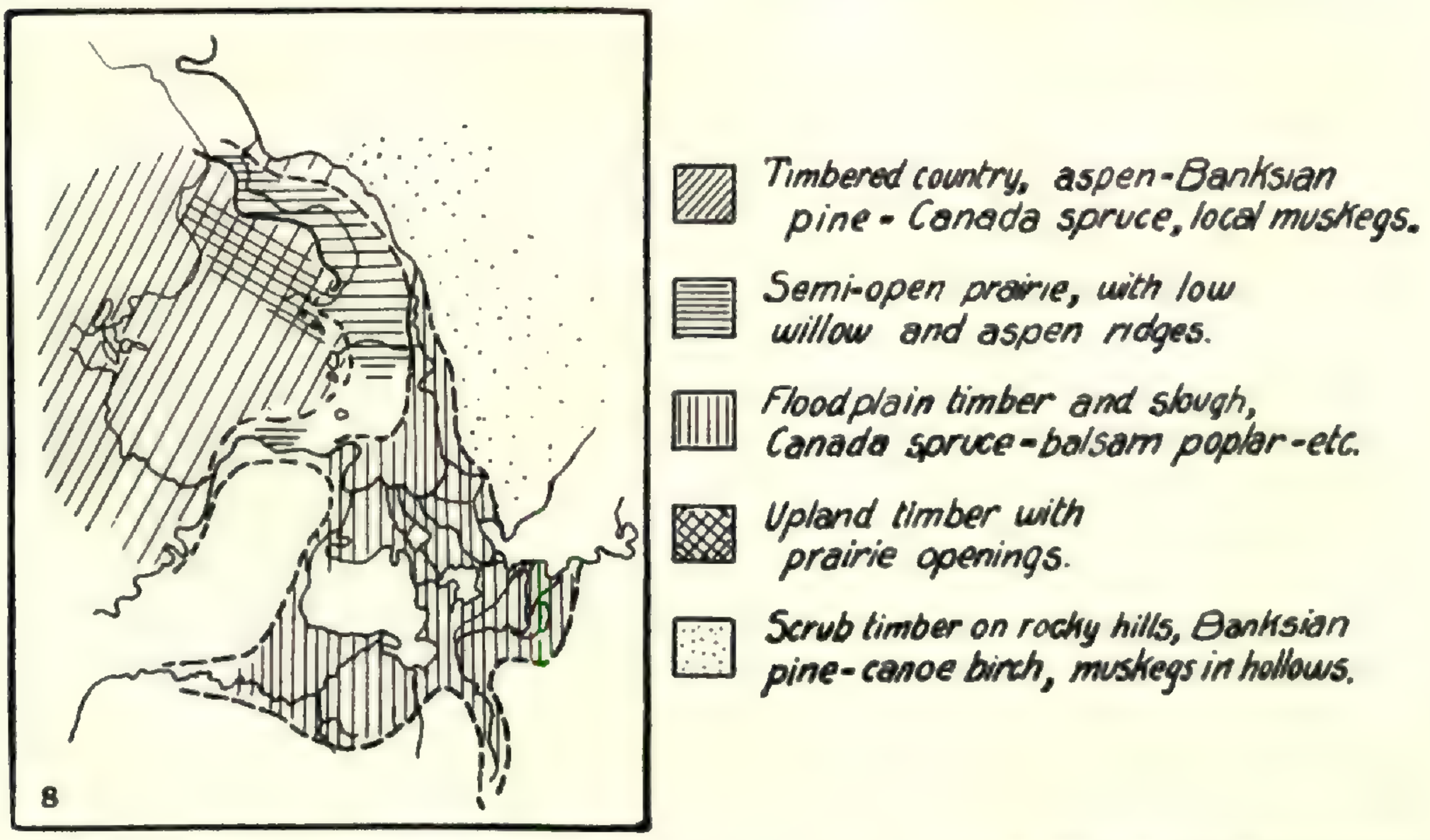


Fig. 8. Map of the vegetation in the lower Athabasca-lower Peace-upper Slave River region.

Holes with fluctuating water levels have a semi-prairie type of vegetation consisting of grasses, sedges, and other herbs, much like that of the prairie openings.

The exposed bottom of the lake which stood at about the 800-foot level has an extensive semi-open prairie country. There are low, willow-covered ridges here and there, with wide, grassy prairie spaces between them. Slightly lower areas contain a marsh vegetation except where the spring and early summer outwash from the salt springs to the westward has stood for some time and made a thin saline deposit. Such areas have a typical salt flat vegetation or are completely barren. The prairies are broken in a few places by sandy ridges which are apparently morainic in origin, and whose positions have not been mapped.

The river banks in the alluvial lowlands, formed by natural levees, have a deep forest of *Picea canadensis*, of which *Populus balsamifera* is a forerunner in the flood plain succession. Abandoned channels and other ponded areas left partially drained by the river's meanderings have an extensive vegetation of sedges and grasses, the former predominating. The newest bars of sand and mud have a willow and *Equisetum* cover.

On the pre-Cambrian upland to the east of Slave River there is a scrub timber of *Pinus Banksiana* and *Betula alaskana*. There is a rich growth of crustose, foliose, and fruticose lichens on the barren hill-tops and in crevices.

The forest on the tops of the Cretaceous plateau areas has not been studied, except for a few observations and collections about the Clearwater-McMurray district. Subsequent notes will show that this varies from that of the Slave River district, having a richer moss and humus mat.

The richest forest in the glacial lake district is that of *Picea canadensis*. It is developed on the better soils of the oldest uplands and upon the better drained parts of the newest alluvial flats. In neither of these is there a leaf mould much exceeding 4 inches in thickness, beneath a moss mat 4 or 5 inches deep at its best development.

Affinities of the Flora of the Athabasca-Great Slave Lake Region

The entire vegetation of the Athabasca-Great Slave Lake district having been removed by the Pleistocene ice, the present flora is a new structure which has been in process of growth since that time. This growth has been slow for two main reasons. The sub-arctic climate with its short growing season is an efficient check. Not only

are the life processes of the plant cover greatly retarded throughout a large part of the year, but also the processes of decay. Dead wood and other plant parts remain for many years without showing signs of disintegration. Axe cuts appear fresh a year after they are made. This condition is reflected in the small amount of humus accumulation in the oldest forests. Descriptions of forests in more southern glaciated regions such as those of Isle Royale[1] indicate that a much larger amount of humus has accumulated there. The climate, tending to retard the development of humus in the soil, is probably an important factor in the production of the relatively thin forests.

The presence of the Glacial lakes, persisting for a long time after the ice had begun to recede, kept large areas from beginning their vegetational development. How long this was in the case of the larger lakes is uncertain. The length of time involved since the retreat of the ice is also unestimated. The country is near the source of ice accumulation, and may have been exposed at a comparatively recent time. Smaller lake basins, such as that of Moose and Bog Lakes, show unmistakable signs, in the present shore lines and in neighboring muskeg and sand ridge areas, of having reached their present level very recently. Extensive areas, then, have acquired their vegetation, much of it spruce forest with a very thin moss and humus carpet, in comparatively recent times, the climatic and time factors appearing to be the most influential in producing the present condition.

In the neighborhood of Fort McMurray, where the Clearwater River enters the Athabasca, there are highlands of Cretaceous rocks upon which there is a thick forest involving not only *Picea canadensis* but also its associate in other regions, *Abies balsamea*. On the upper Clearwater the latter tree is reported to be common by John Macoun, who traversed that region in 1876.[2] More will be found concerning the distribution of this species in another part of the paper.

Into this comparatively young area, with its slowly developing mesophytic conditions, have come plants from widely separated regions. Certain species of *Salix*, *Carex*, and various Gramineae

[1] Cooper, W. S. *The Climax Forest of Isle Royale, Lake Superior, and its Development.* Bot. Gaz. lv. 16 (1913).

[2] Macoun, John. *On the Botanical Features of the Country Traversed from Vancouver Island to Carleton, on the Saskatchewan.* C. G. S. Rept. of Progress (1875–76), 172. (This report contains a good description of the vegetation of the lower Peace and Athabasca Rivers and their deltas.)

have been selected to illustrate these ranges, though other groups could be used equally well. A few other selected species have been used to bring out further the main features. Material in the Gray Herbarium has served as the basis for the maps given, and has been supplemented with records from other sources, carefully examined to eliminate errors. The maps are far from complete, but the writer believes that they are sufficiently representative to indicate the ranges.[1]

A wide-ranging arctic and arctic-alpine flora is represented by *Salix reticulata* (Fig. 10), *Agrostis borealis* (Fig. 11), and *Carex membranacea* (Fig. 9). These species enter the region in the northern and eastern parts of the Great Slave Lake area, where they join such species of eastern American arctic affinity as *Carex supina* (Fig. 13) and *Carex glacialis* (Fig. 12), and with Alaskan-Asiatic species such as *Cypripedium guttatum* (Fig. 14), *Salix alaxensis* (Fig. 15), and *Boschniakia glabra* (Fig. 16). The writer has collected these species on bleak shores and rock hills, or in cold muskegs.

Another group of species is widely distributed from Alaska or western Yukon southward in the mountains and eastward in the great plains regions. It is represented in the Athabasca-Great Slave Lake district by *Bromus Pumpellianus* (Fig. 19), *Stipa comata* (Fig. 17), *Elymus innovatus* (Fig. 18), *Carex obtusata* (Fig. 21), *C. Rossii* (Fig. 20), *Salix lasiandra* (Fig. 22), and *Trientalis arctica* (Fig. 23). *Stipa comata* and *Carex obtusata* have been collected by the writer only in the small prairie area at Peace Pt., on the lower Peace River. *Bromus Pumpellianus* and *Elymus innovatus* are very common species of upland poplar woods. *Trientalis arctica* was collected in 1926 by Mr. John Russel, at the junction of the Nyarling and Little Buffalo Rivers. *Carex Rossii* grows in upland aspen woods along the Slave River, while *Salix lasiandra* is a rather common species in river flood plain deposits.

Southern mountain and great plains floras have contributed *Poa arida* (Fig. 24), *Spartina gracilis* (Fig. 25), *Fluminea festucacea* (Fig. 26), *Agropyron Smithii* var. *molle* (Fig. 27), and *Salix lutea* (Fig. 28). *Poa arida*, *Spartina gracilis*, and *Agropyron Smithii* var. *molle* are to be found in the semi-open prairie areas along the lower Peace and west of the Slave River. *Fluminea festucacea* makes up an important

[1] The ranges in figs. 9–37 are on a base map by J. Paul Goode, published by the University of Chicago Press.

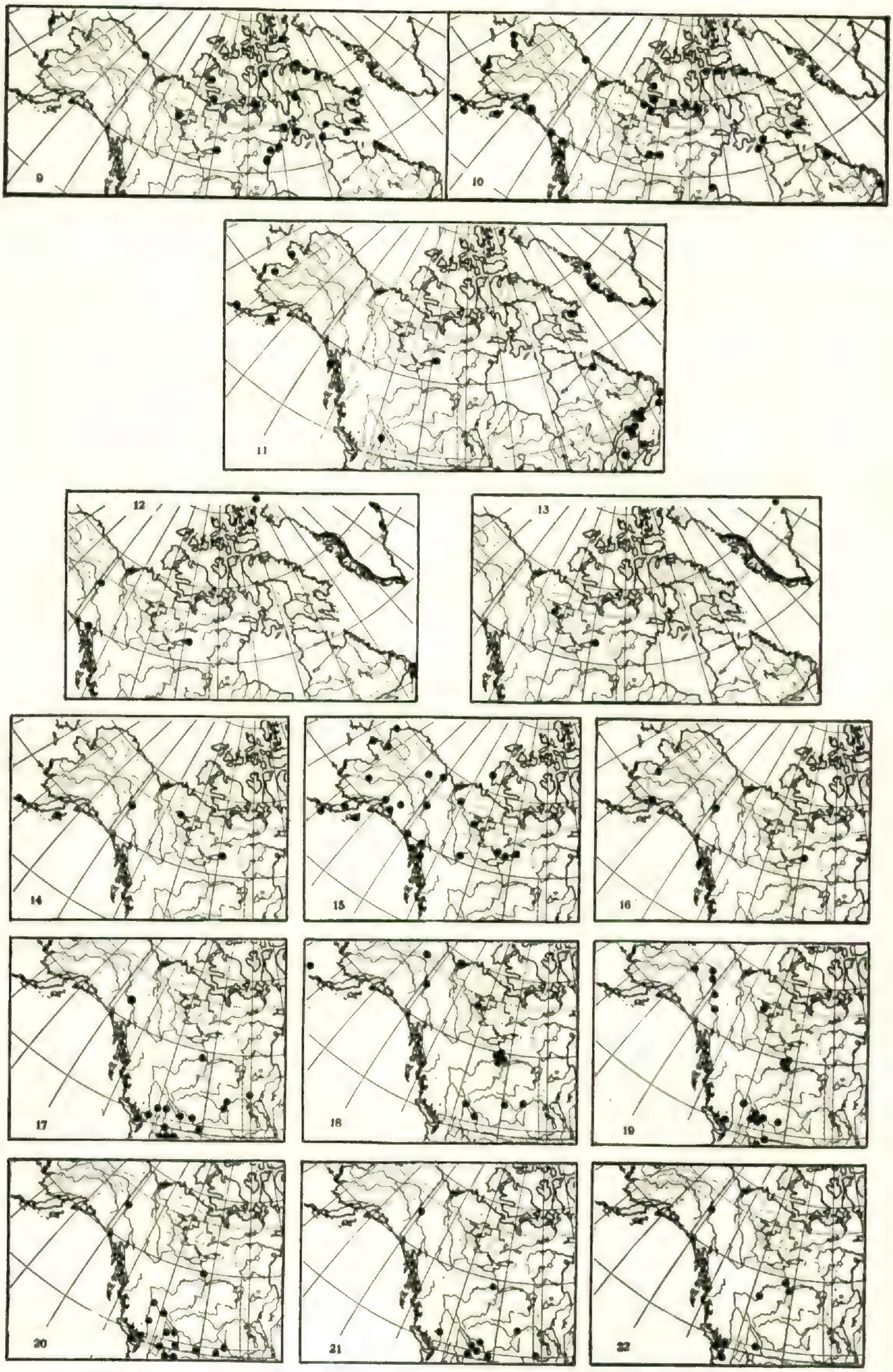
part of the flora of the flood plain meadows along the larger rivers, and is an emergent aquatic species on the gently sloping shores of Moose Lake. *Salix lutea* is a prominent flood plain willow in the Peace-Athabasca delta.

Western mountain species which range eastward to Ontario and New York are *Carex Richardsonii* (Fig. 29) and *C. trichocarpa* var. *aristata* (Fig. 30). The former was collected in dry upland woods along the upper Slave River, and the latter is the most important plant cover of the meadow sloughs in the river flood plains. It here covers many square miles in nearly pure stands. At Moose Lake it was found associated with *Flumincа festucacea* as an emergent aquatic marsh plant.

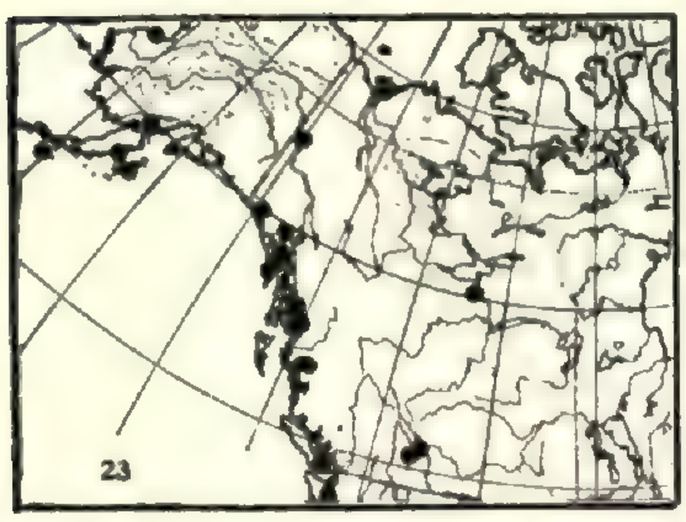
Species with a wide range from northeastern New England, New Brunswick, or the St. Lawrence district to the Cordilleran region, having their greatest northwestward extension in the Athabasca-Great Slave Lake country are *Pinus Banksiana, Muhlenbergia Richardsonis* (Fig. 31), *Carex Sartwellii* (Fig. 32), *C. arcta* (Fig. 34), and *Salix petiolaris* (Fig. 33). *Pinus Banksiana* makes up the timber on the dry ridges of the uplands in the southern part of the district under consideration. On the northern and eastern shores of Great Slave Lake, however, it nearly disappears, and its place is taken by *Picea canadensis. Muhlenbergia Richardsonis* is a plant of salt-flat margins west of the upper Slave River. *Carex Sartwellii* and *C. arcta* have been collected in the prairie along the lower Peace, at Peace Pt. *Salix petiolaris* grows in the flood plain sloughs along the upper Slave River.

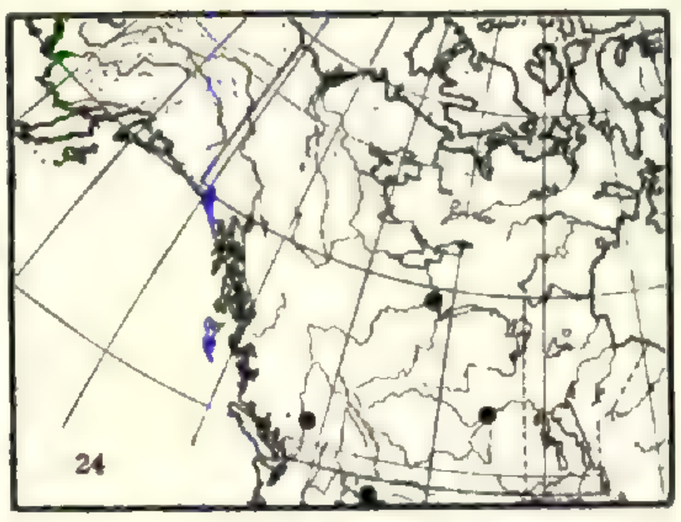
The major trees of the Canadian forest are widely distributed from Newfoundland to Alaska, *Picea canadensis, P. mariana, Populus tremuloides,* and *P. balsamifera.* In the Athabasca-Great Slave Lake district *Picea canadensis* is the tree which forms the deepest, most permanent timber, while the poplars are prominent in burned areas. *Populus balsamifera* is a notable tree, also, in the earlier stages of the flood plain and delta timber. *Picea mariana* is confined to muskeg forest. *Glyceria grandis* (Fig. 37) and *Carex tenuiflora* (Fig. 35) are herbaceous species of similar wide-ranging tendencies. *Glyceria grandis* is prominent on the margins of slough ponds, while *Carex tenuiflora* is an inhabitant of cold bogs.

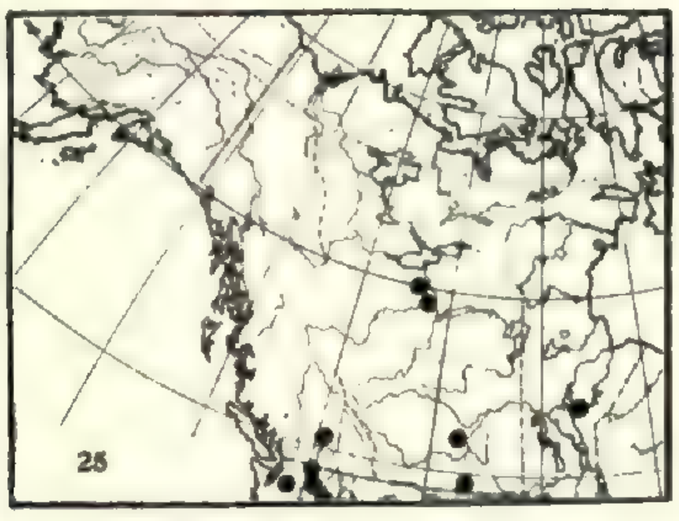
On the sandy beaches of Lake Athabasca is found *Elymus arenarius* var. *villosus* (Fig. 36). It is a widely distributed plant of extensive sandy shores, chiefly maritime. It enters the continent along the main inland waterways.

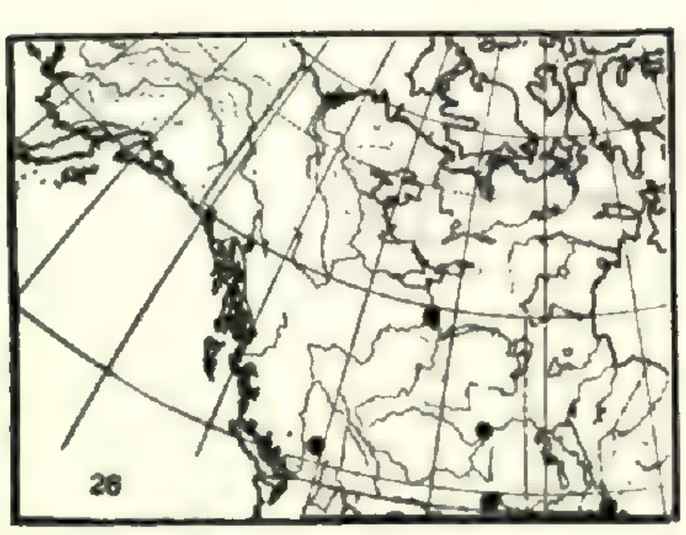


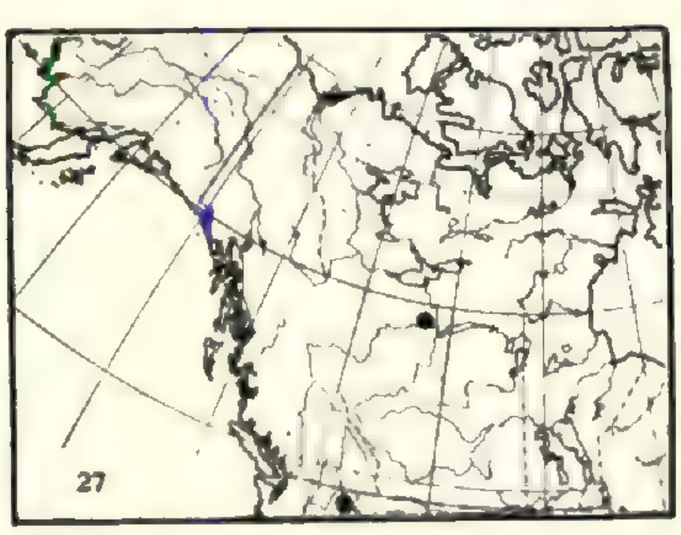
Maps showing the ranges of: (9) *Carex membranacea* Hook.; (10) *Salix reticulata* L.; (11) *Agrostis borealis* Hartm.; (12) *Carex glacialis* Mack.; (13) *C. supina* Wahl.; (14) *Cypripedium guttatum* Swartz; (15) *Salix alaxensis* (And.) Cov.; (16) *Boschniakia glabra* C. A. Meyer; (17) *Stipa comata* Trin. & Rup.; (18) *Elymus innovatus* Beal; (19) *Bromus Pumpellianus* Scribn.; (20) *Carex Rossii Boott;* (21) *C. obtusata* Liljebl.; (22) *Salix lasiandra* Benth.

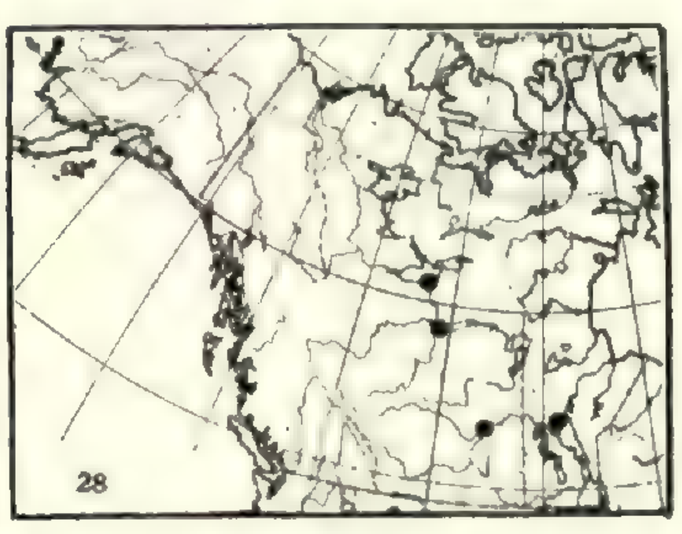


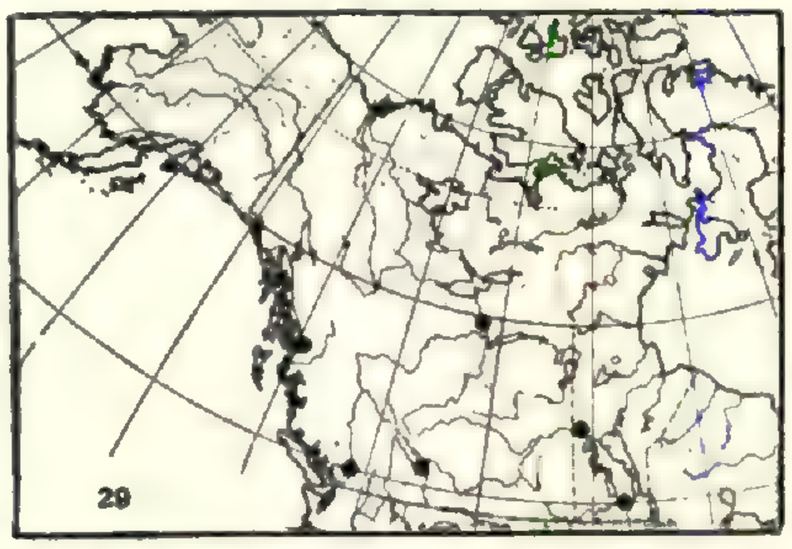


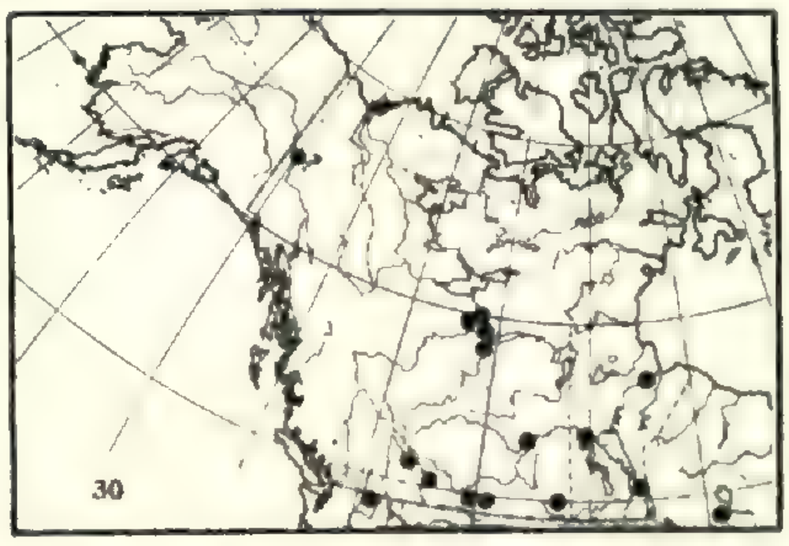


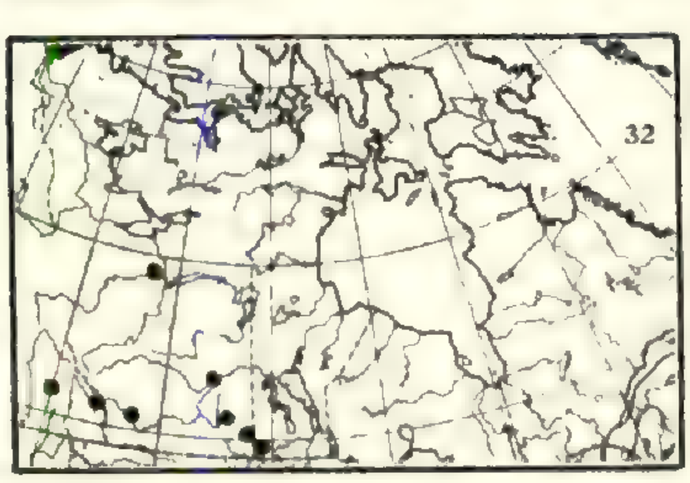


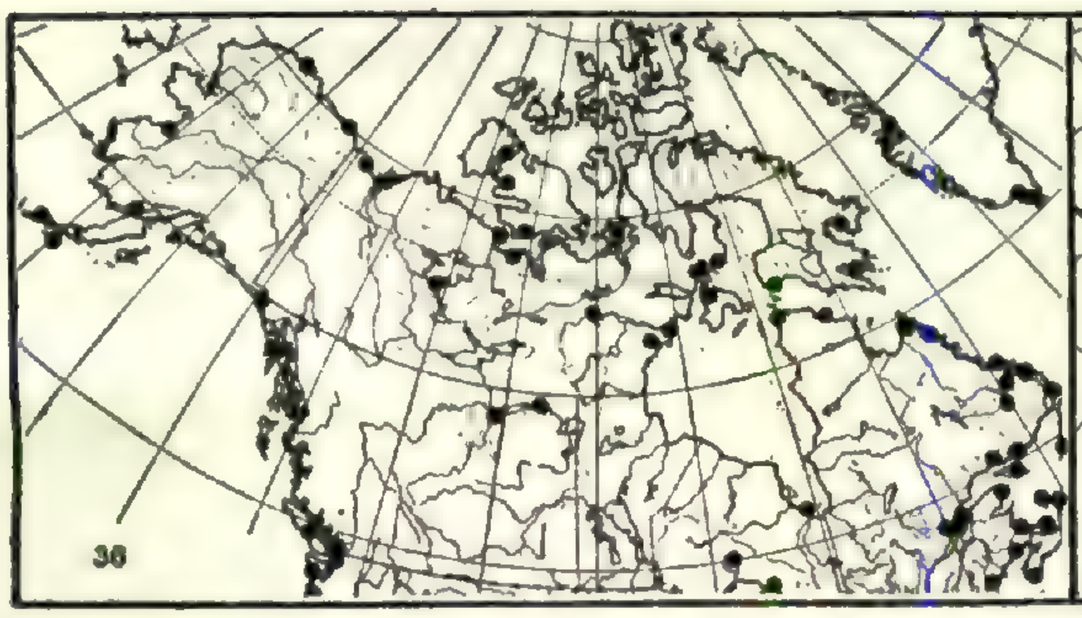


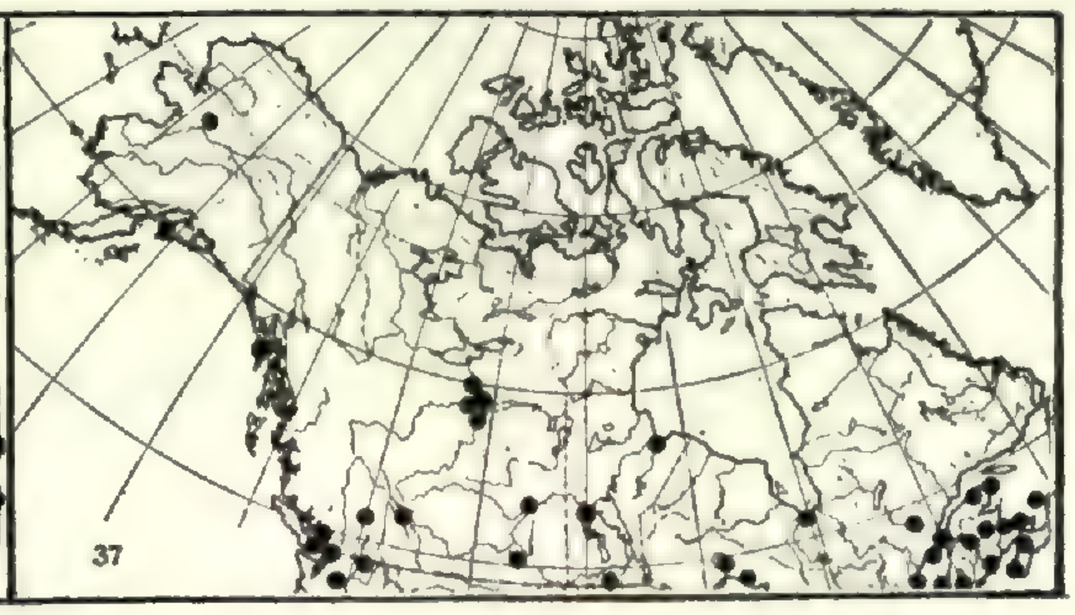












Maps showing the ranges of: (23) *Trientalis arctica* Fisch.; (24) *Poa arida* Vasey; (25) *Spartina gracilis* Trin.; (26) *Fluminea festucacea* (Willd.) Hitchc.; (27) *Agropyron Smithii* Rydb., var. *molle* (Scribn. & Smith) Jones; (28) *Salix lutea* Nutt.; (29) *Carex Richardsonii* R. Br.; (30) *C. trichocarpa* Muhl., var. *aristata* (R. Br.) Bailey; (31) *Muhlenbergia Richardsonis* (Trin.) Rydb.; (32) *Carex Sartwellii* Dewey; (33) *Salix petiolarus* Smith; (34) *Carex arcta* Boott; (35) *C. tenuiflora* Wahlenb.; (36)

On the Absence of Certain Canadian Forest Plants from the Athabasca-Great Slave Lake Region

Four summer's botanizing in the Athabasca-Great Slave Lake district, together with a study of the distribution of certain common Canadian forest species, have shown that there is a conspicuous absence of some plants which are otherwise of very wide distribution. This wide distribution is not entirely limited to temperate regions.

Making use of Cooper's studies in the flora of Isle Royale, Lake Superior,[1] and more especially of Professor M. L. Fernald's extensive knowledge of the flora of northeastern North America, a list of plants has been constructed, which are common in the rich woodlands of eastern Canada. By means of the material in the Gray Herbarium and other records the ranges of these species have been arranged in five groups, as shown in the table, Fig. 38. Group A includes eastern species which reach westward only as far as the forests of northern Manitoba. They are mainly plants of the rich forests which extend from Newfoundland to Ontario. A few, such as *Abies balsamea*, *Acer spicatum*, *Osmorhiza Claytoni*, and *Trientalis borealis*, are known in northern Saskatchewan and Alberta. Group B consists of species which are known from the lower St. Lawrence district and in the mountains of British Colombia, Washington, or Oregon, but are not known in Alaska or in the Athabasca-Great Slave Lake district. Group C is of species ranging northwestward into the Athabasca-Great Slave Lake district, but not into the British Columbia and Alberta mountains. A small group, D, contains species which range westward into the Cordillera and into the Athabasca-Great Slave Lake district, but not to Alaska. Group E contains species which extend from the lower St. Lawrence country to the mountains of British Columbia or western Alberta and north to Alaska or western Yukon, but which do not enter the Athabasca-Great Slave Lake region. A sixth group, F, is of species known throughout the Canadian forest region.

Carex Deweyana is recorded for the Mackenzie basin,[2] but the writer has not collected it in the area under discussion. *Thelypteris Dryopteris*,[3] *Trillium cernuum* var. *macranthum*,[4] and *Cypripedium acaule*[5]

[1] Cooper, W. S. *The Climax Forest of Isle Royale, Lake Superior, and its Development.* Bot. Gaz. lv. Nos. 1, 2, 3 (1913).

[2] Rydberg, P. A. *Flora of the Rocky Mountains and Adjacent Plains.* Second edition, 127 (1922).

[3] Hooker, W. J. *Flora Boreali-Americana*, ii. 259 (1840).

[4] ———, —. —. Ibid. ii. 180.

[5] ———, —. —. Ibid. ii. 204.

have not been collected by the writer, but are reported for the Mackenzie region in *Flora Boreali-Americana*. There are specimens of *Trillium cernuum* var. *macranthum* and *Cypripedium acaule* in the Gray Herbarium, collected by Richardson and labeled "Mackenzie River," and "Fort Franklin," respectively. The occurrence of these plants so far northward of their better-known ranges is worthy of note. *Pyrola minor* is reported by Dr. Richardson[1] as occurring in the barren country between latitude 64° and the arctic coast, but has not been turned up in the Athabasca-Great Slave Lake region.

TABLE SHOWING THE DISTRIBUTION OF CANADIAN FOREST PLANTS

	A	B	C	D	E	F
Thelypteris Dryopteris (L.) Slosson					*	
T. Phegopteris (L.) Slosson					*	
T. spinulosa (O. F. Muell.) Nieuwland					*	
Osmunda Claytoniana L.	*					
Equisetum sylvaticum L.						*
E. arvense L.						*
E. scirpoides Michx.						*
Lycopodium lucidulum Michx.		*				
L. annotinum L.						*
L. obscurum L.					*	
L. complanatum L.						*
Taxus canadensis Marsh.	*					
Picea canadensis (Mill.) BSP.						*
Abies balsamea (L.) Mill.	*					
Poa saltuensis Fernald & Wiegand	*					
Cinna latifolia (Trev.) Griseb.					*	
Carex Deweyana Schwein		*				
Clintonia borealis (Ait.) Raf.	*					
Maianthemum canadense Desf.			*			
Streptopus roseus Michx.					*	
S. amplexifolius (L.) DC.					*	
Trillium cernuum L.	*					
T. undulatum Willd.	*					
Cypripedium parviflorum Salisb.		*				
C. reginae Walt.	*					
C. acaule Ait.	*					
Habenaria orbiculata (Pursh) Torr.					*	
Epipactis repens (L.) Crantz. var. ophioides (Fernald) A. A. Eaton			*			
E. tesselata (Lodd.) A. A. Eaton	*					
E. decipiens (Hook.) Ames					*	
Listera cordata (L.) R. Br.					*	
L. convallarioides (Sw.) Torr.						*
Corallorrhiza trifida Chatelain						*
C. striata Lindl.		*				
Calypso borealis Salisb.						*
Betula lutea Michx. f.	*					
Alnus crispa (Ait.) Pursh			*			
Laportea canadensis (L.) Gaud.	*					

[1] Hooker, W. J. Ibid. ii. 45.

	A	B	C	D	E	F
Geocaulon lividum (Richards.) Fernald						*
Ranunculus recurvatus Poir.	*					
Coptis groenlandica (Oeder) Fernald	*					
Actaea rubra (Ait.) Willd.						*
Dicentra Cucullaria (L.) Bernh.		*				
Mitella nuda L.				*		
Tiarella cordifolia L.	*					
Ribes lacustre (Pers.) Poir.						*
R. prostratum L'Hér.				*		
R. triste Pall.						*
Amelanchier Bartramiana (Tausch.) Roem.	*					
Geum macrophyllum Willd.					*	
Rubus pubescens Raf.				*		
Oxalis montana Raf.	*					
Acer spicatum Lam.	*					
A. pennsylvanicum L.	*					
A. saccharum Marsh.	*					
A. rubrum L.	*					
Viola pallens (Banks) Brainerd					*	
V. incognita Brainerd	*					
V. renifolia Gray		*				
Circaea alpina L.					*	
Aralia nudicaulis L.						*
Osmorhiza obtusa (Coult. & Rose) Fernald					*	
O. Claytoni (Michx.) Clarke	*					
O. divaricata Nutt.					*	
Conioselinum chinense (L.) BSP.	*					
Cornus canadensis L.						*
Moneses uniflora (L.) Gray						*
Pyrola minor L.					*	
P. secunda L.						*
P. chlorantha Sw.				*		
P. elliptica Nutt.		*				
P. asarifolia Michx.						*
Monotropa uniflora L.						*
Epigaea repens L.	*					
Chiogenes hispidula (L.) T. & G.		*				
Vaccinium ovalifolium Sm.					*	
Trientalis borealis Raf.	*					
Orobanche uniflora L.		*				
Galium kamtschaticum Steller					*	
G. triflorum Michx.						*
Lonicera canadensis Marsh.	*					
Linnaea borealis L. var. americana (Forbes) Rehder						*
Viburnum pauciflorum Raf.						*
Solidago macrophylla Pursh.	*					
Petasites palmatus (Ait.) Gray						
Prenanthes altissima L.	*					

The table shows 27 species which are known in the forests of eastern Canada and in the Cordilleran region. 18 of these also range northward to Alaska or western Yukon, while none of the 28 enter the forests of the Athabasca-Great Slave Lake region. The records of

certain species in isolated localities in the more northern part of the Mackenzie basin indicate the possibility of there being a greater number of the otherwise absent species in restricted localities than is known at present.

The cause for the absence or great scarcity and evident localization of so large a number of species in these forests has not been found. If temperature were a controlling factor these species would not be expected to range so widely through temperate and sub-arctic climates. Due to the absence of the vegetable remains of such a condition, it is not probable that there has been, in former post-Glacial time, a more equable climate. The most profitable line of inquiry appears to be in the edaphic factors of the environment, especially in so far as they are affected by the rigorous climate and the short time available since much of the vegetation had its inception.

The small accumulation of vegetable remains in the forests, and the extremely slow rate of decay due to the severe climate have already been mentioned. It is evident from the discussion of the physiographic history of the country that practically the whole region was exposed at a much later time, after the recession of the ice, than were the Cretaceous uplands that border it. An important phase in the solution of the problem will be an extended study of these uplands.

It is of note that such a tree as *Abies balsamea*, which plays such a large part in the forests of Ontario, should find its northern limit in the Athabasca valley approximately at the margin of the Cretaceous upland. Although it has been reported at isolated spots farther northward, the records need verification. The writer has visited the site of one of these records, in the limestone gorge of the Little Buffalo River, west of Ft. Smith, but has been unable to find the trees. If there are but few individuals there, however, they could very easily have been missed. This locality has the richest forest which the writer has seen in the region, a condition probably due to the presence of the gorge with its falls, and the resulting moisture-laden atmosphere that prevails. Sir John Richardson reported the tree at latitude 62°, but was not specific about the locality. It is very common, however, on the uplands about the Clearwater River, as has been stated above. The break in the deep forest conditions along the lower Athabasca is not confined to the trees, although a thorough study has not been made of the situation. Such herbaceous

species as *Disporum trachycarpum* S. Wats. and *Trientalis americana* (Pers.) Pursh also have their northern limit in this district.

Hutchinson's studies in the forests of Ontario indicate that the advance of mesophytic conditions, embodied in the development of a deciduous forest, has lagged behind temperature changes in post-Glacial time, and awaits the slower development of soils.[1] The forests of the Athabasca-Great Slave Lake region may present the same situation in an earlier stage of successional development.

Gray Herbarium,
Harvard University.

THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

John M. Fogg, Jr.

(*Continued from page 180*)

Native plants. The 558 species of indigenous plants on the Elizabeth Islands fall rather clearly into three fairly well differentiated categories. In the first place, there is the southern element—plants of the southern coastal plain which range north from Florida or the Gulf States to achieve their northern limit in southeastern Massachusetts, some of them passing on to Nova Scotia or Newfoundland; then there is a group of species of northern affinities, many of which have already been mentioned in speaking of Nantucket and Cape Cod, which range south or southwest to Massachusetts or, at most, New Jersey. And, finally, there is a large and very important block of plants which fall into neither of the two preceding classes, but belong rather to a continental upland flora than to that which characterizes the lowlying reaches of most of Cape Cod and the adjacent islands. It will be well to analyze briefly the constituents of these three groupings before proceeding further.

The Southern Element. In rather striking contrast to the situation found on Nantucket, where, it will be remembered, over 50% of the indigenous flora is prevailingly more southern in its hue, as well as on the middle part of Cape Cod, where, as has been seen, the native flora is preëminently that of the southern coastal plain, is the

[1] Hutchinson, A. H. *Limiting Factors in Relation to Specific Ranges of Tolerance of Forest Trees.* Bot. Gaz. lxvi. 465–493 (1918).

fact that on the Elizabeth Islands this southern element finds expression in something less than 20% of the total indigenous flora.

It is true that there are a few species of plants of the southern coastal plain which, on the Elizabeth Islands are near the very northeastern limit of their distribution. *Paspalum setaceum*, for example, is known in Massachusetts only from the Elizabeths and Nantucket.[1] *Panicum longifolium* is found nowhere east of Pasque Island, at which place it is abundant in the peaty bog hollows,[2] although it is represented in Nova Scotia by var. *tusketense*.[3] *Tipularia discolor* is near the northeastern limit of its range on one of the Elizabeth Islands (Nashawena) and on Martha's Vineyard. *Rumex verticillatus*, long known from Block Island, but otherwise rare in New England, has recently been collected on the Elizabeths. *Hydrocotyle Canbyi* and *H. verticillata*, both known on the basis of old records from Woods Hole (for years their only known station in New England) have, during the course of the present survey, been discovered on the Elizabeth Islands as well. *Solidago minor* ranges from Alabama and Florida to Virginia, then "jumps" to Nantucket, where it was reported by Bicknell, and is now known to occur on Naushon, the largest of the Elizabeths. Thus it will be seen, that these islands, as is true of nearly every other locality along the coast from New Jersey northward, are not totally lacking in records which represent interesting, or even spectacular, northern extensions of plants which are essentially southern in their affinities.

In general, however, the flora of the Elizabeth Islands far from suggests that of the coastal plain. The following enumeration, which includes the seven species just mentioned, constitutes a nearly complete list of the plants known from these islands which are also characteristic species of the coastal strip, ranging from the Gulf States, Florida or Georgia northeastward. Many of them, of course, continue farther north and east, being known from Nova Scotia, New Brunswick or even Newfoundland, but they are, for the most part, plants of a pronounced austro-riparian origin. It would be difficult to make such a list comprehensive, for, in the absence of adequate data concerning the complete ranges of every species, it is not always easy to state categorically whether a plant belongs exclusively to the southern coastal plain, or whether it enjoys an Alleghanian-Carolin-

[1] See Weatherby, Rhodora, xxx. 133 (1928).
[2] See Fogg, Rhodora, xxxi. 39 (1929).
[3] See Fernald, Rhodora, xxiii. 192 (1921).

ian distribution. All of the species listed below, with the exception of those marked with an asterisk, are known also from Cape Cod.

Woodwardia virginica
Thelypteris simulata
Lycopodium inundatum, var. Bigelovii
Chamaecyparis thyoides
Sparganium eurycarpum
Potamogeton Oakesianus
P. pulcher
Andropogon scoparius, var. polyclados
A. virginicus
*Paspalum setaceum
P. pubescens
Panicum meridionale
P. albemarlense
P. oricola
*P. longifolium
P. Commonsianum
Setaria geniculata
Cenchrus pauciflorus
Stipa avenacea
Aristida purpurascens
Ammophila breviligulata
Spartina alterniflora, var. pilosa
*Diplachne maritima
Cyperus erythrorhizos
C. ferax
Eleocharis rostellata
Fimbristylis autumnalis
Scirpus Olneyi
S. robustus
Rynchospora capitellata
Carex Longii
C. straminea
C. alata
C. Howei
C. Mitchelliana
Xyris caroliniana
Juncus effusus, var. costulatus
Luzula campestris, var. echinata
Smilax rotundifolia
Iris prismatica
Sisyrinchium graminoides
Pogonia ophioglossoides
Calopogon pulchellus
*Tipularia discolor
Myrica caroliniensis
Spergularia rubra
Boehmeria cylindrica, var. Drummondiana
*Rumex verticillatus
Polygonum glaucum
P. punctatum
Drosera intermedia
Pyrus arbutifolia
Rubus Andrewsianus
Rosa palustris
Prunus maritima
Desmodium obtusum
D. marilandicum
Lespedeza capitata
Polygala cruciata
Euphorbia polygonifolia
Ilex opaca
I. glabra
Hibiscus Moscheutos
Hypericum virginicum
Helianthemum canadense
H. Bicknellii
Lechea villosa
L. maritima
Decodon verticillatus
Rhexia virginica
Myriophyllum scabratum
Proserpinaca palustris
*Sanicula canadensis
Hydrocotyle umbellata
H. Canbyi
H. verticillata
Ptilimnium capillaceum
Clethra alnifolia
Rhododendron viscosum, var. glaucum
Leucothoe racemosa
Samolus floribundus
Bartonia virginica
B. paniculata
Nymphoides lacunosum
Asclepias verticillata
Teucrium canadense, var. littorale
Ilysanthes inaequalis
Gratiola aurea
Agalinis maritima
Utricularia gibba
*Plantago virginica

Eupatorium hyssopifolium
Solidago Elliottii
*S. minor
S. tenuifolia
Aster dumosus
A. vimineus
Pluchea camphorata
Gnaphalium purpureum
Coreopsis rosea
Krigia virginica
Lactuca hirsuta
Hieracium Gronovii

A point requiring particular emphasis is, that many of these species are by no means common on the islands. Indeed, a few of them, such as *Thelypteris simulata*, *Paspalum setaceum*, *Panicum longifolium*, *P. Commonsianum*, *Cenchrus pauciflorus*, *Diplachne maritima*, *Eleocharis rostellata*, *Carex straminea*, *C. alata*, *C. Mitchelliana*, *Luzula campestris*, var. *echinata*, *Tipularia discolor*, *Rumex verticillatus*, *Prunus maritima*, *Ilex glabra*, *Sanicula canadensis*, *Hydrocotyle Canbyi*, *Rhododendron viscosum*, var. *glaucum*, *Triosteum perfoliatum*, *Solidago minor* and *Coreopsis rosea*, are known only from a single locality, while certain others, though less restricted, are nevertheless rare and local. And seldom, if ever, are these coastal plain plants present in sufficient abundance to create the impression, inescapable on Cape Cod, of a southern flora transplanted almost *en masse*.

Pursuing this last idea further, it will be found interesting to contrast with the list just given a list of some of the southern coastal plain plants which are known to occur on Cape Cod (most of them from the Middle Cape), but which have not yet been found on the Elizabeth Islands:

Pteridium aquilinum, var. pseudocaudatum
Sagittaria Engelmanniana
S. graminea
S. teres
Paspalum psammophilum
Panicum verrucosum
P. Bicknellii
P. microcarpon
P. annulum
P. mattamuskeetense
P. spretum
P. Wrightianum
P. auburne
P. tsugetorum
P. columbianum
P. polyanthes
P. Ashei
P. scoparium
Aristida dichotoma
A. gracilis
Spartina cynosuroides
Tridens flavus
Cyperus filicinus, var. microdontus
C. Grayii
Eleocharis Robbinsii
E. melanocarpa
Psilocarya scirpoides
Scirpus atrovirens, var. georgianus
S. Eriophorum
Fuirena squarrosa
Hemicarpha micrantha
Rynchospora macrostachya
R. inundata
R. Torreyana
R. capitellata, var. discutiens

Scleria reticularis
Carex annectens
C. intumescens
C. bullata, var. Greenei
Arisaema Stewardsonii
Peltandra virginica
Orontium aquaticum
Xyris Smalliana
Juncus subcaudatus
J. aristulatus
Lilium superbum
Aletris farinosa
Lachnanthes tinctoria
Myrica asplenifolia
Quercus stellata
Q. prinoides
Q. ilicifolia
Comandra umbellata
Polygonum setaceum
Polygonella articulata
Acnida cannabina
Drosera filiformis
Cassia Chamaecrista
Crotalaria sagittalis
Lupinus perennis
Tephrosia virginiana
Desmodium rotundifolium
D. marilandicum
Lespedeza procumbens
L. Stuvei
L. angustifolia
Strophostyles helvola
Linum floridanum, var. intercursum
Polygala Nuttallii
Corema Conradii
Acer rubrum, var. tridens
Ceanothus americanus, var. intermedius
Vitis cordifolia
Hypericum adpressum
Hudsonia ericoides
Viola emarginata
V. primulifolia
Opuntia vulgaris
Rhexia mariana
Oenothera linearis
O. longipedicellata
Proserpinaca pectinata
P. intermedia
Lilaeopsis chinensis
Sabatia campanulata
Cuscuta compacta
Onosmodium virginianum
Stachys hyssopifolia
Lycopus sessilifolius
Agalinis purpurea
Aureolaria pedicularia, var. caesariensis
Utricularia inflata
U. subulata
Viburnum pubescens
Eupatorium verbenaefolium
Mikania scandens
Solidago erecta
S. puberula
Aster spectabilis
A. subulatus
A. tenuifolius
Baccharis halimifolia
Bidens coronata
Lactuca floridana

Thus it will be seen that, while there occur on the Elizabeth Islands something like 100 species belonging to a wideranging southwestern flora, Cape Cod not only has practically every one of these same plants, but boasts in addition at least an equal number of species of the same class which, so far as is known, are totally lacking from the islands.

It may be worth while to note, in passing, that, while an overwhelmingly large proportion of the more than 200 prevailingly southern species which occur on Cape Cod occur likewise on Nantucket (and a considerably smaller proportion on Martha's Vineyard), that island has caught a number of these southern migrants which appear not to have succeeded in reaching the Cape. Several of these may be listed:

Eleocharis tricostata
Scleria triglomerata
Carex Walteriana
Habenaria ciliaris
Quercus pagodaefolia
Polygonum robustius
Amaranthus pumilus
Ranunculus laxicaulis
Ascyron hypericoides
Lespedeza virginica
Lechea Leggettii
Ludvigia alterniflora
Pycnanthemum verticillatum
Schwalbea americana
Aster concolor

Sufficient evidence has probably been adduced to bear out the contention that the relations of the flora of the Elizabeth Islands to that of the southern coastal plain are anything but prominently marked, and that this southern, or southwestern, element is much more strongly represented in the closely adjacent regions, especially Cape Cod and Nantucket. An attempt to determine the causes which account for this break in distribution will shortly be made.

The Northern Element. Although lacking many of the northern types which distinguish the floras of parts of Nantucket and the "Lower" Cape, the Elizabeth Islands are not entirely without their representation of plants whose affinities are prevailingly boreal. In all, about 50 such species, constituting nearly 9% of the total native flora, may be considered as belonging to this class. It is significant to contrast this number with the 150 northern plants (over 20%) listed by Bicknell for Nantucket.

In general, these northern species which occur on the Elizabeth Islands are plants which range from Labrador and Newfoundland south to Massachusetts and New Jersey or, in a few cases, Delaware or Maryland. Many of them range south of New England along the mountains but reach the coastwise southern limit of their distribution in Massachusetts, Long Island or New Jersey. In the list which follows those species marked with an asterisk are to be looked upon as essentially maritime.

*Ruppia maritima, var. subcapitata
*Triglochin maritima
*Agrostis stolonifera, var. compacta
Spartina Michauxiana
Glyceria obtusa
G. canadensis
*Puccinellia paupercula, var. alaskana
Eleocharis uniglumis
Scirpus campestris, var. paludosus
Eriophorum tenellum
Rynchospora fusca
Carex hormathodes
C. silicea
C. canescens, var. disjuncta
C. limosa
C. lanuginosa
Eriocaulon septangulare
Juncus pelocarpus
J. militaris
J. articulatus
Sisyrinchium angustifolium
Liparis Loeselii
Betula populifolia

*Rumex maritimus, var. fueginus
Arenaria lateriflora
Sagina procumbens
*Ranunculus Cymbalaria
Drosera rotundifolia
Fragaria virginiana, var. terrae-novae
*Potentilla pacifica
*Lathyrus maritimus
Rhus glabra, var. borealis
Ilex verticillata, var. fastigiata
Hypericum boreale
Epilobium palustre, var. monticola
Myriophyllum tenellum
*Ligusticum scothicum
*Coelopleurum lucidum
Menyanthes trifoliata, var. minor
Chamaedaphne calyculata
Vaccinium macrocarpon
Limosella subulata
*Plantago juncoides, var. decipiens
Anaphalis margaritacea

The Elizabeth Islands, then, appear to have received their share of those far-ranging northern types which probably owe their existence in coastal New England, and southwestward, to the former presence of the broad continental shelf, already referred to, which permitted of their extension to the southwest and then, following its submergence, left them stranded at isolated localities along the coast. This would also explain why these islands possess fewer such plants than Martha's Vineyard (see p. 173) and still fewer than either Nantucket or the outer portion of Cape Cod. For, if these boreal species reached southeastern New England from off the elevated coastal bench to the eastward, then it seems logical to assume that a greater number of them would have found a refuge on Nantucket and the "Lower" Cape and that a smaller proportion would have succeeded in finding their way to the areas inland to the west, especially if, as may well have been the case, the retreat of the glacial ice from the latter region lagged appreciably behind its retreat from Nantucket, Martha's Vineyard and Cape Cod.

The Continental Element. It is only when we come to consider the continental element as it appears on the Elizabeth Islands that we find ourselves dealing with the type of vegetation which lends a dominating color to their flora. Probably more than 400 plants (about 70% of the total indigenous flora) from these islands are neither prevailingly southern nor northern in their distributional affinities but belong, rather, to a widespread continental flora which might be characterized, somewhat arbitrarily, as Canadian-Alleghanian in nature. This, it will be recognized immediately, is an attribute which the Elizabeths share in common with the upper or inner part of Cape Cod, and, indeed, there is every reason to suppose that the flora of these islands may, until comparatively recent geologic times, have been continuous with that of the line of hills which runs from

Falmouth to Bourne, and even north nearly to Plymouth. This entire ridge represents a terminal moraine which, beyond Cuttyhunk, dips below sea level reappearing, as some geologists believe, to form Block Island and, farther west, a portion of Long Island. The separation of the Elizabeth Islands from the mainland and their division into the seven present members of the chain are, as has already been indicated, relatively modern events. So it is entirely in keeping with the past history of this region that so many of the types which are abundant throughout the Falmouth area should likewise be common on the islands.

The relation of the flora of the Elizabeth Islands to that of the mainland comes out most clearly upon an examination of the forest types. The trees have already been listed (p. 151), but it seems entirely justifiable to repeat in this place that the native woods of the islands are made up not only of beech, *Fagus grandifolia* (surely not a coastal plain type), but also contain *Carya alba, Ostrya virginiana, Quercus alba, Q. velutina, Sassafras officinale, Hamamelis virginiana, Acer rubrum, Cornus florida* and *Nyssa sylvatica.* Now these trees, while they may and do occur on the coastal plain, are nevertheless more common and more clearly at home on the richer soils of the Piedmont and the areas inland, often reaching their finest development on wet wooded slopes and the alluvia of river valleys.

Under the trees listed above, on the wetter parts of the forest floor, occur such plants as *Carex lupulina, Arisaema triphyllum, Oakesia sessilifolia, Maianthemum canadense, Medeola virginiana* and *Trientalis borealis.* These again are types more commonly associated with an Alleghanian woodland flora. The beech drops, *Epifagus virginiana,* a rare plant in southeastern Massachusetts, occurs everywhere in the wooded parts of Naushon and Nashawena, and many other cases of this sort might be cited.

It would be superfluous to list here all of the species of Canadian-Alleghanian affinities which occur on the Elizabeth Islands. An enumeration of them would include most of the names of native plants in the Catalog that follows which have not been listed above in dealing either with the Southern or Northern Elements. A few of the most typical, however, not including the few trees mentioned above, may be given for the sake of comparison:

Polypodium virginianum
Asplenium platyneuron
Athyrium angustum
Osmunda cinnamonea

Ophioglossum vulgatum
Isoetes Engelmanni
Sparganium americanum
Sagittaria latifolia
Andropogon furcatus
Glyceria striata
G. pallida
Elymus virginicus
Cyperus diandrus
C. rivularis
Scirpus cyperinus
Eriophorum virginicum
Carex rosea, var. radiata
C. cephalophora
C. crinita
C. virescens
C. communis
C. pennsylvanica, var. separans
C. digitalis
C. debilis, var. Rudgei
C. lupulina
Arisaema triphyllum
Symplocarpus foetidus
Acorus Calamus
Juncus effusus, var. solutus
Oakesia sessilifolia
Lilium philadelphicum
Maianthemum canadense
Medeola virginiana
Habenaria bracteata
H. clavellata
H. orbiculata
Arethusa bulbosa
Boehmeria cylindrica
Polygonum scandens
Phytolacca americana
Ranunculus delphinifolius
Anemone virginiana
Coptis groenlandica
Spiraea tomentosa
Amelanchier oblongifolia
Geum canadense
Geranium maculatum
Acalypha virginica
A. digyneia
Callitriche heterophylla
Rhus typhina
R. Vernix
R. Toxicodendron
Ilex verticillata
Impatiens biflora
Vitis labrusca
V. aestivalis
Viola papilionacea
V. pallens
Ludvigia palustris
Cicuta maculata
Sium suave
Heracleum lanatum
Monotropa uniflora
M. Hypopithys
Epigaea repens
Gaultheria procumbens
Lysimachia quadrifolia
L. terrestris
Trientalis borealis
Apocynum androsaemifolium
Verbena hastata
Scutellaria galericulata
Pycnanthemum muticum
P. flexuosum
Epifagus virginiana
Cephalanthus occidentalis
Triosteum perfoliatum
Sambucus canadensis
Lobelia cardinalis
Solidago juncea
S. canadensis
Aster divaricatus
Cirsium discolor

The great bulk of these plants are species primarily of the interior; they attain their fullest development in the Piedmont and the Uplands and their occurrence on the coastal plain may be regarded, in most cases, as rather casual.

In summing up, it need merely be pointed out that the Elizabeth Islands, while serving, as does every other locality along the Atlantic coast, as a meeting ground for both northern and southern species of plants, exhibit both qualitatively and quantitatively a very strong

relationship with a widely dispersed flora of a continental nature, a fact which seems readily explicable upon the basis of the close connection existing between these islands and the inner, hilly part of Cape Cod, both as regards geologic history and general topography.

Finally, there remains to be considered, as briefly as may be, the subject of the last glacial advance over this region and its possible effects in influencing the present-day distribution of the flora.

Glacial History. Probably the greatest student of the geology of southeastern Massachusetts since the days of N. S. Shaler, was the late J. B. Woodworth of Harvard University. Professor Woodworth had prepared, shortly before his death, an exhaustive treatment of the glacial history of the Cape Cod region. This manuscript, unfortunately, still awaits publication and the details which it embodies are not yet available. Happily, however, Woodworth had related his broader conclusions to A. P. Brigham, geologist to Colgate University, and the main arguments are set forth by Brigham in his popular book entitled "Cape Cod and The Old Colony."

According to Woodworth, the advance of the last or Wisconsin ice over southeastern Massachusetts took place not as a solid sheet, but in the form of three tongues or lobes. One of these, the "Buzzards Bay Lobe," came down over the region now occupied by Buzzards Bay and deposited as a frontal moraine much of the material which now forms the line of high hills along the northwest shore of Martha's Vineyard, from Menemsha to West Chop. Then, following an interval which represented a retreat and a second advance of the ice, this lobe laid down, as a secondary moraine, the ridge which made the Elizabeth Islands and the "Upper Cape." The line of the islands, as may be seen from a map, almost exactly parallels the line of the morainal hills on the northwest shore of the Vineyard.

The second lobe, which lay to the east of the "Buzzards Bay Lobe," advanced southward over what is now the middle section of Cape Cod and laid down, as a terminal moraine, the sand, gravel and boulders which form the northeast shore of Martha's Vineyard and the higher, crescent-shaped portion of Nantucket. This Woodworth terms the "Cape Cod Lobe." This lobe then retreated, as did the Buzzards Bay Lobe and, as its secondary moraine, deposited the till which composes the "backbone" of Cape Cod from Sandwich to Brewster and Orleans. Thus, Martha's Vineyard was built by the combined action of two lobes and the central and southern parts of the island

represent an outwash or apron plain derived from two separate moraines. The southern and southeastern parts of Nantucket and almost the entire south shore of the Cape likewise represent outwash plains, both formed from the materials deposited by the Cape Cod Lobe.

Still further to the eastward, the third, or "South Channel Lobe" advanced over the area now submerged and known as Georges Banks. With the deposits of this lobe we are not so much concerned, as they now lie mostly beneath the sea, save for such materials as may have contributed to the building of the outer or lower part of Cape Cod. How far this lobe may have extended eastward over the then elevated continental shelf is apparently not definitely known.

It now becomes pertinent to inquire into the relative ages of these deposits and as to whether any evidence is forthcoming to indicate at what time and in what manner the various lobes retreated. Probably Woodworth's report, when it becomes available, will throw much light on this question. However, the writer has it on the authority of Dr. Wigglesworth of the Boston Society of Natural History, who is conversant with Woodworth's views, and who is himself a student of the geology of Martha's Vineyard, that in all probability the middle or Cape Cod lobe was the first one to retreat. If this was the case, it then means that Nantucket, the eastern part of Martha's Vineyard and the central part of Cape Cod were free of ice at a time when the regions to the east and to the west were still covered by the South Channel and Buzzards Bay lobes respectively. Remembering that the coastal shelf was probably considerably higher at that time than it is today, and that the Vineyard, Nantucket and the Cape may well have been continuous dry land, it at once becomes apparent that there was thus opened up an area which soon became available as a refuge for that migration of southern coastal plain species of plants which probably began as soon as the ice commenced to retreat.

It is necessary to point out here that there is a lack of complete agreement as to the exact period of subsidence of the continental shelf and as to whether this migration might have occurred *previous* to the advent of the Wisconsin ice or whether it could not possibly have taken place until after the glacier had receded.

Douglas Johnson, the eminent student of coastal phenomena, in discussing the date of submergence of the Banks cuesta (i. e., the New England-Acadian portion of the outer coastal shelf) states that

"we should expect the subsidence to be at least post-Miocene and more probably post-Pliocene."[1] And further, "It seems probable that the date of submergence of the drowned topography must be post-Tertiary."[2] Johnson, then, is inclined to view the elevation of the continental shelf as pre-glacial rather than post-glacial, a condition which would have necessitated the plant migration having antedated the advent of the Wisconsin ice. And, indeed, Fernald sees no reason why these plants should not have moved northeastward along the exposed shelf before the coming of the Wisconsin glaciation and "have persisted outside the subsequently glaciated area, finally taking possession of their present isolated habitats on the receding of the ice."[3]

In connection with the present study, however, it matters little whether these species of the southern coastal plain reached the New England area before or after the last glaciation. In either case they must have moved inland from off the broad shelf to the eastward to take the places left vacant for them by the recession of the ice, and if we are justified in assuming that it was the Cape Cod Lobe of the glacier which receded first, then we are in a position to understand why so many of these species are to be found upon Nantucket and the "Middle" Cape, and, to a lesser degree, upon the eastern portion of Martha's Vineyard and are so generally lacking from the Elizabeth Islands and inner Cape Cod. Even if the western half of the Vineyard, the Elizabeth Islands and the "Upper" Cape were free from ice at the time when this migration was operative, it seems likely that they offered a type of habitat which was less attractive to these coastal plain plants than the low-lying silicious areas of Nantucket and the "Middle" Cape which they must have reached first and where they today abound, seldom exhibiting a tendency to widen their ranges into the neighboring regions. And although, as Fernald suggests, these plants may have persisted upon the outer shelf while the ice still covered the area inland, it is nevertheless probable that the Nantucket-"Middle" Cape region would have been the first to witness their return.

Conclusion: In summing up, it may be said that, considered from the viewpoint of broad, geographic origins, the native flora of the

[1] Johnson, D. The New England-Acadian Shoreline. New York. 302 (1925).
[2] Ibid. 312, 313.
[3] Fernald, M. L. A Preliminary Statement of Results of Studies on the Northeastward Distribution of the Coastal Plain Flora. Amer. Jour. Sci. 4th Ser. xl. 18 (1915).

Elizabeth Islands is seen to consist of three distinct elements. In the first place, there are those species (less than 20%) which exhibit a relationship with the flora of the southern coastal plain. Their presence upon these islands is to be explained upon the basis of a former land connection with New Jersey and southward which took the form of an elevation of the outer coastal bench, now submerged, and which, either prior to or following the Wisconsin glaciation, permitted of the migration of plants from the southwest to the New England area and even farther north and east. That so many more of these southern plants occur upon Cape Cod and Nantucket than upon the Elizabeth Islands is probably to be explained by the behavior of the glacial lobes which covered this area and which, by their differential recession, seem to have rendered the former areas accessible to occupation by plants at an earlier date. Secondly, there is a small percentage (less than 9%) of plants displaying a boreal affinity, the occurrence of which may be attributed to a counter extension southward along this same uplifted shelf. And the fact that the Elizabeth Islands have received a smaller number of these northern representatives than either Cape Cod or Nantucket is probably to be accounted for on the basis of their inland position and the character of the habitat which they offer, which is, in general, less favorable for these northern plants than the situations which they occupy on the "Lower" Cape. And, finally, there is the overwhelming majority (over 70%) of plants occurring on the Elizabeth Islands which show an essential relationship with the flora of the mainland and which give to the islands the dominating character of a Canadian-Alleghanian region. The prevalence of this continental element is doubtless due to the close geologic and physiographic similarity existing between these islands and the "Upper" Cape. Thus it will be seen that the evidence derived from a study of the geographic origin of the flora of the Elizabeth Islands fits rather well into what is already known concerning the history of the neighboring territory and that these islands take their place botanically as an extension of the adjacent mainland rather than as a link in that chain of outposts of a formerly continuous but now highly disrupted coastal plain flora extending from the South Atlantic States to Newfoundland.

Acknowledgements. The writer desires to express his profound and grateful appreciation of the stimulating genius of Professor M. L. Fernald under whose guidance this study has been conducted and without whose inspiration it could never have been completed.

Mr. C. A. Weatherby and Mr. Bayard Long have both rendered invaluable assistance in their willingness to aid in the determination of critical material. To them the writer's deepest thanks are due.

He is also indebted to Professor L. H. Bailey, who has kindly examined several specimens of *Rubus*, to Professor K. M. Wiegand, who has looked over some of the *Amelanchier* material, and to Mrs. Agnes Chase who has given her opinion on a few sheets of *Panicum*.

(*To be continued*)

GENTIANA PROCERA Holm, forma **laevicalyx**, n. f. calycium carinis, glabris.—Locally in Michigan and Indiana. MICHIGAN: shore of Lake Superior, *Whitney;* low wet grounds, Detroit, September 26, 1901, *Farwell*, no. 1447 c. INDIANA: frequent in one place in the sedge border of the north side of Bruce Lake, Fulton County, September 21, 1928, *Deam*, no. 46,341 (TYPE in Gray Herb.).

G. procera Holm, Ott. Nat. xv. 111, 179, t. xii. figs. 3–5 (1901), ordinarily has the keels of the calyx scabrous at least at base. Forma *laevicalyx* appears to be inseparable from it in any character except the quite glabrous calyx; but on account of this character it is likely to be mistaken for the much smaller *G. Victorinii* Fernald, RHODORA, xxv. 87, t. 139 (1923) of the estuary of the St. Lawrence. *G. Victorinii*, however, besides by its much smaller flowers, is distinguished from *G. procera*, forma *laevicalyx* by its shorter and more erect branches and peduncles, much less fringed corolla-lobes and stipitate (instead of essentially sessile) capsule.—M. L. FERNALD, Gray Herbarium.

THE IDENTITY OF ALOPECURUS AEQUALIS.—Following the lead of Schinz & Thellung,[1] progressive botanists have taken up the name *Alopecurus aequalis* Sobol. Fl. Petrop. 16 (1799) in place of the later *A. aristulatus* Michx. Fl. Bor.-Am. i. 43 (1803) or *A. fulvus* Sm. Engl. Bot. xxi. t. 1467 (1805). A discussion of the question was published by me in RHODORA, xxvii. 196 (1925). More recently, however, Jansen & Wachter, in a detailed study of the genus, *Floristische Aanteekeningen XXIV* (*Alopecurus*), attempt to show[2] that the iden-

[1] Schinz & Thellung, Bull. Herb. Boiss. 2me sér. vii. 396 (1907); Viertelj. Naturf. Gesells. Zürich, lxvi. 291 (1921).

[2] Jansen & Wachter, Nederlandsch Kruidkundig Archief, Jaarg. 1929, Afl. i. 69 (1929).

tity of *A. aequalis* is open to question. Their chief point is that, since species no. 44, *Alopecurus geniculatus*, of Sobolewski was really not an *Alopecurus* at all but *Agrostis stolonifera*, with "corollis muticis," we are not fully justified in inferring that Sobolewski's species no. 45, "ALOPECURUS AEQUALIS. Aristis gluma aequalibus (Sob.)" has been correctly identified. Although Jansen & Wachter feel that the identity of *A. aequalis* is uncertain, they admit that the brief diagnosis given of it, "Aristis gluma aequalibus" is a characteristic mark of the species ("Dit is inderdaad een karakteristiek kenmerk der soort"). Sobolewski misidentified plate 564 in Flora Danica as *Alopecurus geniculatus*, whereas it really represents *Agrostis stolonifera* with a tightly contracted panicle. Surely any one else looking casually at the plate, without noting the details, might readily pass it as *Alopecurus*. Its habital resemblance to plate 861, representing *Alopecurus geniculatus*, is striking enough. Consequently, when Sobolewski described a new species as *Alopecurus aequalis*, which differed from his conception (Fl. Dan. t. 564) of *A. geniculatus* by having "Aristis gluma aequalibus" and which "In lacubus natans est," he was giving a rather vivid account of the plant subsequently described as *A. aristulatus* Michx. (1803) and as *A. fulvus* Sm. (1805). Unless some more convincing objection is brought forward we shall be justified in continuing the use of the name *A. aequalis* in this sense. —M. L. Fernald, Gray Herbarium.

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Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 32. November, 1930. No. 383.

THE CASE FOR POLYGONUM CUSPIDATUM SIEB. & ZUCC.

ALBERT N. STEWARD

A COARSE almost shrubby herb reaching a height of from one to three meters, rather commonly planted in North American gardens and perhaps more often escaped from cultivation, is this remarkable *Polygonum* from eastern Asia which Siebold and Zuccarini named for the characteristic cuspidate form of the leaf blade.[1]

During recent studies in the *Polygoneae* of eastern Asia the writer has found certain practices in nomenclature which have led some authors to reject this and other well known names without apparent valid reason under either the International Rules of Botanical Nomenclature or the American Code.

Dr. L. H. Bailey has referred to the bibliography accompanying Bot. Mag. t. 6503 as the basis for his use of "*Polygonum Sieboldii* De Vriese."[2] This bibliography appears to be a literal copy of that given by Meisner in DC. Prodr. xiv. 136, which is as follows: "P. Sieboldi hort. nonnull. De Vriese in Nederl. Kruidkund. Archief. 2, p. 254* et in Jaarb. d. Koninkl. Nederl. Maatschap. van Tuinb. te Leyden 1850, cum ic. Flora 1851, p. 523. Lindl., et Paxt. mag. 1, p. 137 cum fig. Paxt. Fl. Gard. 1852, 1, p. 137, fig. 90." The meaning of the * following the first reference is not clear. All of the references, however, are to the cultivated form of *P. cuspidatum* Sieb. & Zucc. The name *P. Sieboldi* occurs only in the second of the three references, a photograph of which has been seen through the kindness of Dr. Bailey, and there it is given only as a synonym in a bibliography which is in full as follows:

[1] Siebold & Zuccarini, Fl. Jap. Fam. Nat. Pt. 2, p. 84 [n. 731] (1846).
[2] Bailey, Cyclop. Amer. Hort. 1393, f. 1880 (1901).

POLYGONUM CUSPIDATUM S. ET Z.

. . . . . .

Polygonum cuspidatum Sieb. & Zucc. Fl. Jap. fam. nat. in Act. Monoc. IV. Bd. 1844–1846. p. 208.
Polygonum pictum Sieb. Cat. des pl. du Japon, cf. Jaarboek der Koninkl. Nederl. Maatsch. tot Aanam. van den Tuinbouw. 1848. p. 44.
Polygonum Sieboldi Rwdt. in Mss.[1]

The name *P. cuspidatum* Willd., because of which *P. cuspidatum* Sieb. & Zucc. is displaced by Small[2] and following him by Bailey, l. c., occurs, so far as is known to the writer, only as an herbarium name given by Sprengel (Syst. ii. 256) as a synonym for *P. acuminatum* Kunth. The use of the name *P. Sieboldi* hort. by Meisner as a synonym for *P. cuspidatum* Sieb. & Zucc. is preceded (p. 133) by the regular use of *P. Sieboldi* Meisn. for a plant of § *Echinocaulon*.

It has been the practice of a number of botanists to consider a name non-valid for later use if it has previously occurred in print, regardless of whether or not such occurrence was in a form which could be considered proper publication. This procedure may be illustrated by the three examples from the literature of the genus *Polgonum* which are cited below:

1. **Polygonum Zuccarinii** Small.
   Polygonum cuspidatum Siebold & Zuccarini, Fl. Japon. Fam. Nat. 2: 84 (1846), not Willd.—Small, l. c.
2. **POLYGONUM Sièboldii**, De Vriese (*P. cuspidatum*, Sieb. & Zucc., not Willd. *P. Zuccarinii*, Small).—Bailey, l. c.
3. **Polygonum Portoricense** Bertero.

   - - - - -

   Polygonum densiflorum Meisner in Mart. Fl. Bras. 5: 13 (1855), not Blume; - - - .
   Polygonum Portoricense Bertero; Meisn. in DC. Prodr. 14: 121 (1856), as synonym.—Small, op. cit. 46.

In the first two examples *P. cuspidatum* Sieb. & Zucc. is thrown down because of Willdenow's herbarium name given only in synonymy by Sprengel. In the third example *P. densiflorum* Meisn. is displaced by *P. portoricense*, an herbarium name given by Meisner as a synonym, because of a supposed *P. densiflorum* Blume. Weatherby has pointed out (Rhodora xxv. 20) that *P. densiflorum* Blume began with an error in Index Kewensis, apparently based on Blume's *P. corymbosum* var. *densiflorum* (Bijd. 534).

Neither the International Rules nor the American Code gives support to such procedures, for (1) Article 50 of the International

[1] De Vriese in Jaarb. Koninkl. Nederl. Maats. Aanmoed. Tuinb. 1849, p. 31 (1850).
[2] Small in Mem. Bot. Col. Coll. i. 158 t. 66 [Monogr. Polygon.] (1895).

Rules states that a name shall not be rejected "because of the existence of an earlier homonym which is universally considered as non-valid" (p. 48) and Article 37 states that "Citation in synonymy or incidental mention of a name is not effective publication." (p. 43). (2) Although Canon 16 of the American Code states that "A name is rejected when preoccupied (homonym). (a) A specific name is a homonym when it has been published for another species under the same generic name,"[1] it is nevertheless true that the names used in the cases just cited above cannot be considered as homonyms under Canon 16 because Canon 12 states that "A name is not published by its citation in synonymy or by incidental mention." (l. c. 171) and one of the examples given presents *Acrostichum Plumieri* Desv. herb. given as a synonym of *A. viscosum* Fée, stating that the former name is not "published" and does not invalidate *A. Plumieri* Fée. Neither *P. cuspidatum* Willd. nor *P. densiflorum* Blume have, then, been "published" according to either the International Rules or the American Code, so *P. cuspidatum* Sieb. & Zucc. and *P. densiflorum* Meisn. should not be displaced because of them.

Gray Herbarium.

An Exceptionally Large Onoclea sensibilis.—On the 11th of August, 1929, I found on Pine St., Peterborough, New Hampshire, an exceptionally large *Onoclea sensibilis* Linn. that seems worth recording. The plant was in a damp situation and growing out from an Arbor Vitae hedge, which doubtless in part caused the elongation of the fronds. A sterile frond, from the base of the stalk to the tip of the frond, measured 51¼ inches in length, the frond at the broadest part near the base measured 16½ inches in width, and the leafy expansion from base to tip measured 19½ inches in length. Several other fronds on the same plant were of nearly or quite the same dimensions.

In Eaton's Ferns of North America it is recorded of the sensitive fern that the tallest fronds are often fully three feet in height. This height is much exceeded by the specimen here cited.—Robert Tracy Jackson, Peterborough, New Hampshire.

[Dr. Jackson's *Onoclea* certainly far exceeds the conventionally published maximum measurements. The recording of his extremely large specimen will,

[1] Bull. Torr. Bot. Club xxxiv. 174 (1907).

naturally, challenge others. As a first record of still larger individuals we may note one in the Club herbarium, from the alluvium of the Penobscot River, with stipe 45 inches tall and leafy expanded frond 20¾ inches long, giving a total length from base of stipe to tip of frond of 65¾ inches (5 feet, 5¾ inches). This frond has a breadth of 19½ inches, but another frond from the same region with the stipe broken off (consequently disqualified for competition) measures 23½ inches broad. The fertile fronds of these plants stand exactly 2 feet high. A frond in the Gray Herbarium, collected by the late William Boott "near Boston," has the leafy half 20¼ inches long.—EDS.]

THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

JOHN M. FOGG, JR.

(*Continued from page 221*)

PART II. ANNOTATED LIST OF THE VASCULAR FLORA

In the Catalog of Vascular Plants of the Elizabeth Islands which follows several conventions and abbreviations have, for the sake of convenience, been adopted; these are here explained:

NOMENCLATURE. The International Rules of Botanical Nomenclature have been followed.

ELEMENTS IN THE FLORA. The various elements constituting the flora have been differentiated thus:

Indigenous species appear in capital letters.
Introduced species are given in *italics*.
Discredited records are included in brackets.

CITATIONS AND SYNONYMY. Synonyms are given in italics and, in general, are included only when they represent names which have been superseded since the last edition of Gray's Manual (Ed. 7, 1908). Usually, in such cases, a reference is given to the place where the new name was published or its status discussed.

LOCALITIES. The seven main islands are indicated by taking the first three letters of the name of each; thus:

NON: Nonamesset, including Pine Island.
UNC: Uncatena
NAU: Naushon, including Captain's Island, Ram's Head, Monohansett, Buck, East Buck, West Buck and the Weepeckets.
PAS: Pasque.
NAS: Nashawena.
CUT: Cuttyhunk.
PEN: Penikese, including Gull Island.

COLLECTORS. Those who have collected specimens from the islands, or who have reported plants from there, are designated by the use of the surname; this is followed by the serial collection number, where the collector has employed a numbering system, otherwise by the date. A list of the chief collectors is here given in alphabetical order:

Cushman, J. A. (1906)
Duggar, B. M. (1911)
Faxon, C. E. (1875)
Faxon, Walter (1873)
Fernald, M. L. (1927)
Hervey, E. W. (no date)
Hollick, Arthur (1898)
Jordan, David S. (1873)
MacRae, Lillian (1904)
Moore, A. H. (1904)
Northrop, Alice R. (1901, 1903)
Pennell, F. W. (1911)
Sanford, S. N. F. (1917)
Simons, Elizabeth A. (1901)
Sipe, S. B. (1901)
Svenson, H. K. (1926)
Taylor, W. R. (1919–1921)
Weir, "Miss" (1890)
Williams, E. F. (1911)

Further information concerning these collectors and the distribution of their material may be found in the section on Previous Botanical Work on the Islands (Pages 123–125).

N. B. Serial numbers unpreceded by a name are to be taken as representing material collected by the present writer.

HERBARIA. The following system of initials has been employed to designate the herbaria in which specimens have been seen or to which they are known to have been distributed:

(A) Academy of Natural Sciences of Philadelphia
(B) Boston Society of Natural History
(C) Cornell University
(G) Gray Herbarium, Harvard University
(J) Arnold Arboretum, Jamaica Plain, Mass.
(M) Missouri Botanical Garden
(N) New England Botanical Club
(P) University of Pennsylvania
(U) United States National Museum
(W) Marine Biological Laboratory, Woods Hole, Mass.
(Y) New York Botanical Garden
(o) no specimen seen

POLYPODIACEAE

POLYPODIUM VIRGINIANUM L. *P. vulgare* of eastern American authors. See Fernald, RHODORA, xxiv. 125 (1922). Rare; seen growing only upon a large boulder in the woods on Naushon. NAU: *Hollick* (o), 2489 (N); NAS: *Northrop* (o).

PTERIDIUM AQUILINUM (L.) Kuhn, var. LATIUSCULUM (Desv.) Underwood. *Pteris aquilina* of the Manual. Apparently not common; sandy woods. NON: 2672 (N); NAU: 3329 (P); NAS: *Northrop* (o).

WOODWARDIA VIRGINICA (L.) Sm. Locally abundant; forms considerable growth around the dune ponds on Nashawena. NAU: *Williams*, July 10, 1911 (N); NAS: *Northrop*, July, 1901 (Y), 1772 (N,P).

W. AREOLATA (L.) Moore. Locally abundant; with *Thelypteris palustris*, var. *pubescens* occupying boggy hollows in open hills. PAS: *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop*, Aug. 1901 (Y), 3492 (N,P); CUT: 2324 (G,N,P,M).

ASPLENIUM PLATYNEURON (L.) Oakes. Reported by Mrs. Northrop from Nashawena; no specimen seen.

ATHYRIUM ANGUSTUM (Willd.) Presl. *Asplenium filix-femina* of American authors in part. See Butters, RHODORA, xix. 190 (1917). Boggy woods and open hillsides. NAS: 3515 (P); CUT: 2535 (N).

A. ANGUSTUM, var. ELATIUS (Link) Butters. RHODORA, xix. 191 (1917). Dry, exposed hillside. PEN: 459 (N,P,W).

THELYPTERIS PALUSTRIS (Salisb.) Schott, var. PUBESCENS (Lawson) Fernald. *Aspidium Thelypteris* of Manual. See Fernald, RHODORA, xxxi. 34 (1929). Common in low, boggy ground and around borders of ponds. NON: 2238 (N); UNC: 2993 (N); NAU: *Sipe*, Aug. 1901 (W); NAS: *Northrop* (o), 2349 (N,P); CUT: *Sanford*, Aug. 15, 1917 (N), 2323 (N); PEN: 460 (N,P,W,M).

T. SIMULATA (Dav.) Nieuwl. *Aspidium simulatum* Dav. See Weatherby, RHODORA, xxi. 174, 178 (1919). Apparently rare on the islands. NAU: *Sipe*, July, 1901 (W); PAS: *Svenson*, Sept. 8, 1926 (N).

T. NOVEBORACENSIS (L.) Nieuwl. *Aspidium noveboracense* (L.) Sw. Moist woodland. NON: 2907 (G,N,P,M,C); NAS: *Northrop* (o), 3514 (P).

T. SPINULOSA (O. F. Müller) Nieuwl. *Aspidium spinulosum* (O. F. Müller) Sw. Reported by Mrs. Northrop from Nashawena; no specimen seen.

DENNSTAEDTIA PUNCTILOBULA (Michx.) Moore. *Dicksonia punctilobula* (Michx.) Gray. Rocky, open hillsides. NAS: *Northrop* (o), 3509 (P); CUT: 2534 (N,P); PEN: 461 (N,P,W,M).

ONOCLEA SENSIBILIS L. Apparently not abundant. NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N).

OSMUNDACEAE

OSMUNDA REGALIS L., var. SPECTABILIS (Willd.) Gray. Occasional in open bogs. NAS: *Northrop* (o), 1777 (P).

O. CINNAMOMEA L. Bogs and wet hollows. NON: 2881 (N); UNC: 3029 (N); NAS: *Northrop* (o), 3513 (P); CUT: 3450 (P).

OPHIOGLOSSACEAE

OPHIOGLOSSUM VULGATUM L. Found only in a sandy field at the east end of Cuttyhunk, near Cuttyhunk Pond. NAS: *Northrop* (o); CUT: 3582 (N,P).

[BOTRYCHIUM MATRICARIAE (Schrank) Spreng. is reported by Mrs. Northrop for Nashawena. This may refer to *B. dissectum* Spreng. or one of its allies, but in the absence of herbarium material it seems best to disregard the record entirely.]

EQUISETACEAE

EQUISETUM ARVENSE L. Seen only in a boggy clearing in the woods at the east end of Naushon. NAU: 701 (P,W).

LYCOPODIACEAE

LYCOPODIUM INUNDATUM L., var. BIGELOVII Tuckerm. Peaty margins of ponds. NON: 3381 (N); NAU: 3865 (P).

ISOETACEAE

ISOETES ENGELMANNI A. Br. A single sheet of this species collected on Nashawena by C. E. Faxon, but bearing no date, is in the Gray Herbarium.

PINACEAE

PINUS STROBUS L. Reported by Mrs. Northrop from Nashawena, where probably introduced; no specimen seen.

P. RIGIDA Mill. A small group of these trees grows at the extreme east end of Naushon near the West Gutter. Seen nowhere else, although perhaps more common. NAU: 3425 (N,P).

P. sylvestris L. Scotch Pine has been introduced on several of the islands but seems nowhere to be spreading. NAU: 3871 (N); NAS: *Northrop* (o), 3482 (P); PEN: 462 (W).

Larix decidua Mill. Planted at several localities along the north shore of Naushon. NAU: 3870 (N,P,M,C).

Picea Abies (L.) Karst. *P. excelsa* Link. This and the next two have been planted extensively along the north shore of Naushon. NAU: 3692 (J,P).

P. glauca Voss. *P. canadensis* B. S. P. NAU: 3690 (J,P), 3691 (J,P), 3869 (J,N).

P. pungens Engelm. NAU: 3868 (J,P).

CHAMAECYPARIS THYOIDES (L.) B. S. P. Of infrequent occurrence on the islands, although plentiful around a large pond near Tarpaulin Cove on Naushon. NAU: *Williams*, July 10, 1911 (N), 3884 (P,M,C).

JUNIPERUS COMMUNIS L., var. DEPRESSA Pursh. Collected only on the north shore of Naushon, where it may possibly have been introduced. NAU: 3872 (N,P).

J. VIRGINIANA L. Plentiful in the woods near the East Gutter on Nonamesset; not seen elsewhere. NON: 2668 (N, P); NAS: *Northrop* (o).

TYPHACEAE

TYPHA LATIFOLIA L. Swamps and pond borders. NON: 2675 (N); NAS: *Northrop* (o); PEN: 463 (N,W).

T. ANGUSTIFOLIA L. Mostly in brackish areas near the shore. NON: 3165 (N); NAU: 3887 (P); NAS: *Northrop* (o), 1766 (P).

SPARGANIACEAE

SPARGANIUM EURYCARPUM Engelm. Found at two stations; both of them swampy hollows in woods at east end of Naushon. NAU: 3153 (N,P), 3678 (P,M).

S. ANDROCLADUM (Engelm.) Morong. *S. lucidum* Fernald & Eames. See Fernald, RHODORA, xxiv. 27 (1922). Growing in swampy area at east end of Naushon near Hadley Harbor. NAU: 2469 (N,P).

S. AMERICANUM Nutt. Including var. *androcladum* of the Manual. Swampy woods and pond holes; rather common. NON: 2904 (N,P); UNC: 3015 (N,P), 3113 (P); NAU: 2382 (P,C), 2383 (N,P,M); NAS: 3527 (N,P,M).

NAJADACEAE

POTAMOGETON OAKESIANUS Robbins. In a small pool bordered by *Decodon verticillatus* along the north shore of Naushon, near the east end. NAU: 3867 (N,P,M).

P. PULCHER Tuckerm. The commonest Pondweed on the islands; met with frequently in the small pond holes, where it often continues to grow upon the mud after the ponds become dry in late summer. This species produces fruit rather abundantly. UNC: 2997 (G,N,P), 3013 (P,M); NAU: 711 (P); PAS: 710 (P,M); NAS: *Faxon, C. E.*, no date (G), 3505 (N).

P. BUPLEUROIDES Fernald. Found growing abundantly in Gosnold or West End Pond on Cuttyhunk on July 15, 1925. This pond, formerly fresh, had evidently been inundated by the sea the preceding winter; it has remained brackish ever since. CUT: 1001 (P,W).

[P. PUSILLUS L. is reported by Mrs. Northrop for Nashawena but no specimen has been seen. Inasmuch as *P. pusillus* has been a source of considerable confusion and there is no way of deciding the correct application of this name without material this record can not be allowed.]

P. DIVERSIFOLIUS Raf. *P. hybridus* of the Manual, in part. Collected only from the sandy borders of the dune ponds on Nashawena, but probably more widespread. NAS: 1083 (P,W), 1775 (N,P).

P. PECTINATUS L. Abundant in a somewhat brackish pond along the south shore of Nonamesset; should be found elsewhere. NON: 2875 (N,P).

RUPPIA MARITIMA L., var. LONGIPES Hagström. See Fernald & Wiegand, RHODORA, xvi. 125 (1914). NON: 2246 (N,P,M,C), 2876 (N); NAU: *Pennell* 3151 (W); CUT: 2333 (G,N,P,M,C).

All of the material of *R. maritima* with long podogynes (1–6 cm.) seems to have, at least in maturity, peduncles which are well over 3 cm. in length and which are often much longer and usually spiralled.

If var. *rostrata* Agardh, with mature peduncles 0.5–3 cm. long, occurs on these islands it has still to be collected.

R. MARITIMA L., var. SUBCAPITATA Fernald & Wiegand. RHODORA, xvi. 126 (1914). NON: 2251 (N,P); NAU: *Duggar*, July, 1911 (G); *Pennell* 3152 (P,W); PAS: 712 (N,P,W).

This variety with very short podogynes (2–6 mm.) was originally described from material collected on Naushon. Its range has since been extended from Quebec and Prince Edward Island to Block Island, Rhode Island.

ZOSTERA MARINA L. Frequent in the shallow coves and small tidal streams. NON: 2285 (G,N,P); NAS: *Northrop* (o); PEN: 464 (W), 1762 (N,P).

Material collected in Sheep Pen Harbor on Nonamesset and from near the landing on Penikese is remarkable for the copiousness with which it produces flowers and fruits; this fact has been observed without fail for several seasons.

JUNCAGINACEAE

TRIGLOCHIN MARITIMA L. Apparently rare on the Elizabeth Islands, although common in brackish marshes on the adjacent mainland. NAS: *Northrop*, Aug. 1901 (Y).

ALISMACEAE

SAGITTARIA LATIFOLIA Willd. Not common; swampy hollow in woods near Tarpaulin Cove. NAU: 2384 (N).

S. LATIFOLIA Willd., forma HASTATA (Pursh) Robinson. Form with very narrow, acute leaves. UNC: 3003 (N).

HYDROCHARITACEAE

VALLISNERIA AMERICANA Michx. *V. spiralis* of Manual; see Fernald, RHODORA, xx. 108 (1918). Abundant in "Sheep Pond" near west end of Cuttyhunk. CUT: 2532 (G,N,P,M).

GRAMINEAE

ANDROPOGON SCOPARIUS Michx., var. FREQUENS Hubbard. See RHODORA, xix. 103 (1917). Abundant everywhere on open hills and sandy lowlands. NON: 2585 (P,C), 2911 (N,P,M); UNC: 3109 (N), NAU: 3924 (N,P,M); PAS: *Svenson*, Sept. 8, 1926 (N), 3753 (P); CUT: *Sanford*, Aug. 15, 1917 (N).

A. SCOPARIUS Michx., var. POLYCLADOS Scribn. & Ball. *A. littoralis* Nash. *A. scoparius*, var. *littoralis* (Nash) Hitchc. See RHODORA, xix. 103 (1917). Collected on the white sand beach bordering West End Pond on Naushon. NAU: 2940 (G,N,P).

A. GLOMERATUS (Walt.) B. S. P. Seen only in a low brackish marsh near the east end of Naushon; probably more abundant. NAU: 3333 (N,P,M).

A. VIRGINICUS L. Open grassland and pond borders: material collected on Nonamesset has conspicuously hairy lower leaves and sheaths. NON: 3915 (N,P,M,C); UNC: 3118 (N).

A. FURCATUS Muhl. Sandy fields and clearings; not common. UNC: 3011 (N,P); NAU: 2603 (N,P).

Digitaria sanguinalis (L.) Scop. Disturbed sandy areas. UNC: 3107 (P,M), 3053 (N,P); PEN: *Jordan* (o).

PASPALUM SETACEUM Michx. Found growing abundantly on the exposed grassy slopes at the extreme east end of Nashawena. NAS: 3549 (N,P).

This grass, rare in New England, is known elsewhere in Massachusetts only from Nantucket. See Weatherby, RHODORA, XXX. 133 (1928).

P. PUBESCENS Muhl. Including *P. Muhlenbergii* Nash. See Weatherby, RHODORA, XXX. 134 (1928). Abundant everywhere on open grassy hillsides. UNC: 2967 (N,P), 3642 (P); NAU: 2599 (N), 3885 (P,C); CUT: *Sanford*, Aug. 15, 1917 (N), 2538 (N,P,M).

PANICUM CAPILLARE L. Seen growing only along border of salt marsh at west end of Nonamesset. NON: 2899 (N,P,M).

P. DICHOTOMIFLORUM Michx. Occasional in moist grassy hollows. NON: 3197 (N,P).

P. VIRGATUM L., var. SPISSUM Linder. RHODORA, XXIV. 14 (1922). This variety with densely tufted culms seems entirely to replace the species on the Elizabeth Islands. Common in open grassland, wet hollows and sandy clearings. NON: 2632 (P); UNC: 3030 (N,P,M); NAU: 3908 (N,P); PAS: 3763 (P,C), 3786 (N,P,M); NAS: 2360 (N,P); PEN: 1093 (P,W).

P. LONGIFOLIUM Torr. This species, known elsewhere in Massachusetts only from Marion, Plymouth County, was collected in the peaty and boggy hollows at the east end of Pasque on August 28, 1928. See Fogg, RHODORA, XXXI. 39 (1929). PAS: 3787 (N,P,W).

P. DEPAUPERATUM Muhl., var. PSILOPHYLLUM Fernald. RHODORA, XXIII. 193 (1921). This species is represented on the islands only by the smooth-leaved variety. Grassy and sandy slopes. NON: 2579 (N); NAU: 2491 (N,P), 3319 (P).

P. DICHOTOMUM L. Mostly in open sandy woods. NON: 2650 (N), 3423 (P,M); NAU: 2478 (N,W), 2483 (P), 3906 (N,P,C).

P. LINDHEIMERI Nash, var. FASCICULATUM (Torr.) Fernald. *P. P. huachucae* Ashe. *P. huachucae*, var. *silvicola* Hitchc. & Chase. *P. tennesseense* Ashe. See Fernald, RHODORA, XXIII. 223 (1921). NON: 2295 (N,P,W), 2301 (W,C), 2589 (P), 2633 (P,M), 2648 (P,W), 2660 (N), 3176 (P), 3374 (P,U), 3375 (P), 3376 (P,U), 3420 (P,U); NAU: 2931 (N,P), 3903 (P,U); CUT: 2266 (N,P,M), 3433 (P,U,C), 3456 (P,U); PEN: 478 (N,P,W), 3405 (P).

This is the most ubiquitous and the most variable *Panicum* on the islands. Of the specimens cited Mrs. Agnes Chase, who has kindly examined some of the material from the Elizabeths, has designated no. 3374 as *P. implicatum* Scribn., no. 3420 as typical *P. huachucae* Ashe, and nos. 3376, 3433, 3456 and 3903 as *P. huachucae*, var. *silvicola* Hitchc. & Chase. In speaking of no. 3420 Mrs. Chase says, "The pubescence on upper surface of blades varies from very scant or almost wanting to fairly copious." Thus, degree of pubescence varies, not only as between separate plants, but in different parts of the same plant and, in view of the many intermediates which make it impossible here to draw sharp specific or even varietal lines, it seems best to follow the more conservative treatment of this species proposed by Fernald, l. c. p. 226. Viewed in this light, the Elizabeth Islands material with spikelets 1.5–2.1 mm. long and leaf-blades short-pilose to glabrous above, falls into the variety *fasciculatum*.

P. MERIDIONALE Ashe. Abundant on exposed grassy slopes. Often very slender with leaves not over 1.5 mm. wide. NON: 2582 (P); NAU: *Taylor*, July 24, 1917 (P); NAS: 2452 (N), 3550 (N,P); CUT: 2537 (N,P); PEN: 3404 (P).

P. ALBEMARLENSE Ashe. This southern species, found abundantly in recent years on the "Middle" Cape, is known from two stations on the Elizabeth Islands, both of them exposed sandy areas. UNC: 3082 (N,P); CUT: 2264 (N,P,W).

P. ORICOLA Hitchc. & Chase. Sandy woods, hillsides and pond borders. NAU: 718 (W), 2492 (P), 2714 (N), 3681 (P); NAS: 2359 (N), 3466 (P); PEN: 479 (P,W).

The lines between this and *P. meridionale* are not always sharp; in fact, the two behave more like varieties of one polymorphic species. Differences in size of spikelets are trivial, pubescence cannot be relied upon, and habit varies with the situation in which these plants grow. To be sure, there is a well marked *meridionale* extreme and an equally characteristic *oricola* one, but between them an almost complete series of integradations.

P. COMMONSIANUM Ashe. Met with only on an open sandy bank along the north shore of Naushon, west of Kettle Cove. NAU: 3875 (N,P,M,C).

P. SPHAEROCARPON Ell. Occasional on open grassy downs. NON: 2647 (N,W), 3419 (P); NAS: 3556 (N).

P. CLANDESTINUM L. Sandy woods and clearings; not common. UNC: 3041 (N); NAU: 3148 (N,P).

Echinochloa Crusgalli (L.) Beauv. A weed near cultivated areas. UNC: 3063 (N); NAS: *Northrop* (o); PEN: 1092 (P, W).

E. Walteri (Pursh) Nash. Moist, usually brackish, situations. NON: 3188 (N); UNC: 2992 (N); NAU: 3156 (C), 3888 (P,M,C).

Setaria geniculata (Lam.) Beauv. See Hitchc. Contr. U. S. Nat. Herb. xxii. 168 (1920). Open grassland and around borders of brackish areas. NON: 2695 (N,P); UNC: 3033 (N,P), 3103 (N,P).

This species is in urgent need of further study, for even a casual examination of a large series of specimens is sufficient to indicate that our perennial Foxtail of the salt marshes of New England is distinct from the far-ranging southern plant which occurs in tropical and subtropical America.

S. glauca (L.) Beauv. See Rhodora, xxxi. 109, 110 (1929). Disturbed sandy area near beach. UNC: 3098 (N).

S. viridis (L.) Beauv. Reported by Jordan from Penikese; no specimen.

Cenchrus pauciflorus Benth. *C. carolinianus* of Manual. See Chase, Contrib. U. S. Nat. Herb., xxii. 67 (1920). Seen only in sandy field near east end of Pasque. PAS: 3766 (N,P,M,C).

[C. tribuloides L., reported by Mrs. Northrop from Nashawena, probably refers to the preceding. *C. tribuloides* is unknown east of Long Island.]

Leersia oryzoides (L.) Sw., forma inclusa (Wiesb.) Fogg. See Rhodora, xxx. 81 (1928). The only material of the Rice Cut-grass seen on the islands grew on the sandy margin of Mary's Lake and had the panicles enclosed within the upper leaf-sheaths. NAU: 3135 (G,N,P,M).

Phalaris canariensis L. Sandy area near landing at east end of Pasque. PAS: 1794 (P).

Anthoxanthum odoratum L. Everywhere in open grassland. NON: 2250 (N,P,M); NAU: 3315 (P,C); PEN: 468 (N,P,W,M).

Stipa avenacea L. Apparently rare and local. NAS: *Northrop* (o), 3560 (P).

Aristida purpurascens Poir. Abundant on exposed hillsides, especially on Naushon. NAU: 1010 (P,W), 3140 (N), 3683 (P).

Phleum pratense L. Seemingly only on outer islands, where abundant on open slopes. CUT: 2280 (N); PEN: 480 (W).

Agrostis stolonifera L. *A. alba* of most American authors, not L. See Malte, Canada Dept. Mines, Bull. no. 50. (1926). Grassland and sandy fields. NON: 2653 (N), 3418 (P); PAS: 3772 (P); NAS: *Pennell* 2914 (P); PEN: 3390 (N,P).

A. stolonifera L., var. compacta Hartm. *A. alba*, var. *maritima* (Lam.) Mey. See Malte, l. c. Beaches and brackish situations. NON: 2721 (P), 3417 (N); NAU: 2713 (N); PEN: 3397 (N,P,M,C).

A. tenuis Sibth. *A. vulgaris* With. *A. alba*, var. *vulgaris* (With.) Thurb. Doubtfully *A. capillaris* L. See Malte, l. c. Dry hillsides and hollows. NON: 3352 (P); PEN: 466 (P,W), 3391 (P).

A. HYEMALIS (Walt.) B. S. P. Sandy woods; occasional. NAU: *Pennell* 3124 (W,P), 3918 (N).

A. PERENNANS (Walt.) Tuckerm. Sandy woods and clearings; more frequent than the preceding. NAU: 2679 (P), 3881 (N,P), 3904 (N).

CALAMAGROSTIS CANADENSIS (Michx.) Beauv. Wet hollows and borders of ponds. NON: 3359 (N); NAS: 1007 (P,W), *Williams*, July 10, 1911 (N); CUT: 3453 (P,M).

C. CINNOIDES (Muhl.) Barton. Seen only in a boggy thicket near Job's Neck. NAU: 2604 (N,P).

AMMOPHILA BREVILIGULATA Fernald. *A. arenaria* of Manual. See Fernald, RHODORA, xxii. 70 (1920). Cobble and sandy beaches. NON: 2698 (N,P,M,C); UNC: 3058 (N); PEN: 467 (W).

Holcus lanatus L. Ubiquitous in grassland and sandy fields and clearings. NON: 2291 (N,P); NAU: 2709 (N,P); NAS: *Northrop* (o); CUT: *Taylor* 2408 (P), 3455 (P,C); PEN: 477 (N,P,W,M).

DESCHAMPSIA FLEXUOSA (L.) Trin. Dry woods near Tarpaulin Cove. NAU: 1009 (N,P,W).

Avena sativa L. Sandy soil near cultivated area. PEN: 469 (W).

DANTHONIA SPICATA (L.) Beauv. Abundant on dry knolls and open clearings. NON: 2249 (N,P), 2658 (P); PEN: 473 (P,W).

Several trends are evident in material of this species from these islands and elsewhere in eastern North America. Specimens collected from the beach near French Watering Place, Naushon, for example, have lemmas with the aristate teeth of *D. sericea*, although lacking the pubescence of that species. This material can be satisfactorily referred to nothing included in our existing treatments of the genus. It is hoped that the intensive study of our American material already embarked upon by the writer may lead to a better understanding of these puzzling forms. A large series of collections is being held for critical examination and comparison with types, but the preceding may be referred to as fairly typical of *D. spicata* as it is commonly understood.

SPARTINA MICHAUXIANA Hitchc. Boggy hollows and pond margins, often near shore. NON: 2908 (N); NAU: 2380 (N); NAS: 2341 (N,P); CUT: 3440 (P).

S. ALTERNIFLORA Loisel., var. PILOSA (Merrill) Fernald. *S. glabra*, var. *pilosa* Merrill. See Fernald, RHODORA, xviii. 179 (1916). Brackish marshes and upper borders of beaches. NON: 2896 (P), 2909 (P), 2910 (N,P,M); UNC: 3095 (N,P); NAU: 3685 (N); PAS: *Svenson*, Sept. 8, 1926 (N); PEN: 482 (P,W).

S. PATENS (Ait.) Muhl. Brackish marshes; fairly common. NON: 2292 (N,P,M,C); NAS: *Northrop* (o); PEN: 483 (P,W).

S. PATENS (Ait.) Muhl., var. JUNCEA (Michx.) Hitchc. Seen grow-

ing only on sandy upper beach on Uncatena. NON: *Cushman* 126 (B); UNC: 3049 (N).

S. PATENS (Ait.) Muhl., var. CAESPITOSA (A. A. Eaton) Hitchc. This variety, characterized by its densely tufted habit, was collected in a brackish marsh near Tarpaulin Cove, where it formed a dense turf. NAU: 2377 (N,P).

DIPLACHNE MARITIMA Bickn. Bull. Torr. Bot. Cl. xxxv. 195 (1908.) Found only along a brackish ditch near Tarpaulin Cove. NAU: 3889 (N,P,M).

PHRAGMITES COMMUNIS Trin. Occasional in swampy situations. NAU: 1803 (N,P,W), 2608 (P); NAS: *W. Faxon*, Aug. 1873 (G), *Northrop*, Aug. 1901 (Y).

TRIPLASIS PURPUREA (Walt.) Chapm. Abundant on beaches and low sandy stretches. NON: 2871 (N,P,W,M,C); UNC: 3009 (N,P,M); NAU: 2510 (N), 2732 (P); PAS: 3754 (P).

ERAGROSTIS PECTINACEA (Michx.) Steud. Common everywhere on open grassland and in sandy clearings, except on the outer islands. NON: 2580 (P,W), 3167 (N); UNC: 3651 (P); NAU: 3919 (N,P,C); PAS: 3765 (P,M); NAS: *Northrop*, Aug. 1901 (Y).

An intensive search has failed completely to reveal var. *spectabilis* Gray with smooth sheaths, which is abundant on Martha's Vineyard and Nantucket.

DISTICHLIS SPICATA (L.) Greene. With *Spartina patens* in brackish marshes. NON: 2901 (P), 3208 (N); UNC: 2694 (P), 3097 (N); PAS: 3737 (P,M); PEN: 1091 (P,W).

Dactylis glomerata L. Sandy soil near cultivated area on Penikese; otherwise not seen, although probably more general. PEN: 472 (N,P,W,M).

Poa annua L. Not common. Disturbed sandy areas on two of the islands. NAU: 3311 (P); PEN: 3389 (P).

[P. SEROTINA Ehrh. Reported by Jordan from Penikese. This may refer to *P. palustris* L. (*P. triflora* Gilib.), but, in the absence of material, it seems best to disregard the record.]

P. PRATENSIS L. Fairly common on open downs. NON: 3249 (N,P), 3351 (P); PEN: 481 (P,W), 3388 (N,P,M).

GLYCERIA OBTUSA (Muhl.) Trin. Pond borders and moist hollows. NAU: 2934 (N,P); NAS: *Northrop*, Aug. 1901 (Y), 2348 (N,P,C).

G. CANADENSIS (Michx.) Trin. Border of *Decodon* swamp near Tarpaulin Cove. NAU: 2396 (N,P).

G. STRIATA (Lam.) Hitchc. *G. nervata* (Willd.) Trin. Boggy woods; apparently local. NAU: 2479 (N).

G. PALLIDA (Torr.) Trin. Swampy woods and wet hollows. NON: 2575 (N,P), 3358 (P), 3371 (P); NAU: 2470 (P); NAS: 3525 (N,P,M, C).

G. ACUTIFLORA Torr. Found almost completely submerged in several small ponds on Nonamesset and one on Nashawena. NON: 2243 (G,N), 3344 (P), 3380 (P,C); NAS: 3524 (N,P,M).

[PUCCINELLIA MARITIMA (Huds.) Parl. Reported by Jordan from Penikese but probably refers to the following which, though unknown from Penikese, grows on the neighboring island of Cuttyhunk.]

P. PAUPERCULA (Holm) Fernald & Weatherby, var. ALASKANA (Scribn. & Merr.) Fernald & Weatherby. RHODORA, xviii. 18 (1916). Abundant on mud flats bordering Cuttyhunk Pond. CUT: 3572 (N,P,W,M,C).

Festuca Myuros L. Edge of sandy road leading to Tarpaulin Cove. NAU: 2509 (N,P).

F. OCTOFLORA Walt. Apparently not general. NON: *Pennell* 2847 (W).

F. RUBRA L. One of the commonest grasses on the islands. Gravel banks, borders of beaches, open downs, sandy clearings, etc. NON: 2845 (W,P), 3349 (P), 3350 (N,P), 3370 (P), 3416 (P); NAU: 2712 (N,P,M), 3877 (N,P,C); CUT: 2279 (N,P); PEN: 476 (N,P,W).

Extremely variable as to habit, texture of foliage and degree of glaucousness.

F. OVINA L. Reported by Mrs. Northrop from Nashawena and by Jordan from Penikese. No material seen, but this record is allowed to stand for the present.

F. elatior L. Found only on Penikese, where abundant in certain areas. PEN: 475 (P,W).

Bromus secalinus L. Growing in dry sandy ground along east shore of Penikese. PEN: 470 (W).

B. hordeaceus L. Disturbed sandy areas on Nonamesset and along path near landing on Penikese. NON: *Pennell* 2839 (W), 3304 (N,P), 3347 (P,M,C); PEN: 3412 (N,P).

Agropyron repens L. Apparently not abundant except on outer islands, where it takes possession of large sandy areas. CUT: 2278 (N,P,M); PEN: 465 (W), 3387 (N,P).

ELYMUS VIRGINICUS L. Collected only on Gull Island, Penikese, where the plant is unusually robust. Reported by Jordan from Penikese proper, but not seen there recently. PEN: 474 (N,P,W).

E. VIRGINICUS L., var. HALOPHILUS (Bickn.) Wiegand. RHODORA, xx. 83 (1918). Dry sandy banks facing the sea at west end of Uncatena. UNC: 3119 (N), 3648 (P).

CYPERACEAE

CYPERUS DIANDRUS Torr. Wet depressions and pond borders. NON: 3198 (N); UNC: 3021 (N); NAU: 2737 (N,P,W).

C. RIVULARIS Kunth. Seen only growing with the preceding on grassy bank bordering French Watering Place. NAU: 2739 (N); NAS: *Northrop* (o).

C. FILICINUS Vahl. *C. Nuttallii* Eddy. Borders of fresh ponds and low brackish areas. NON: 2700 (N,P), 2889 (P); UNC: 3007 (N,P), 3048 (P); NAU: *Cushman* 313 (B), 2725 (N), 3864 (P).

C. DENTATUS Torr. Not common; sandy margins of several ponds on Naushon. NAU: 2467 (C), 2920 (P,M), 2935 (N,P,M).

C. ERYTHRORHIZOS Muhl. Reported by Mrs. Northrop for Nashawena; no specimen seen.

C. FERAX Rich. Borders of brackish marshes and low swales; not common. NON: 2897 (N); NAU: 2369 (G,P,C), 3155 (N,P,W,M).

C. STRIGOSUS L. Of rather frequent occurrence in pond-holes, borders of salt marshes, upper beaches, and moist clearings. NON: 2665 (P); UNC: 2982 (P), 2991 (N,P), 3057 (W); PAS: 3781 (P).

C. STRIGOSUS L., var. ROBUSTIOR Kunth. Moist depression in open hills. UNC: 3083 (N,P,W).

C. STRIGOSUS L., var. COMPOSITUS Britton. Small pond-hole at west end of island. UNC: 3020 (N,P,W).

C. FILICULMIS Vahl., var. MACILENTUS Fernald. Dry open ground and sandy clearings everywhere. NON: 2587 (N); UNC: 3061 (N); NAU: 742 (P,W); PAS: 3769 (N); NAS: *Northrop*, as "*C. filiculmis*" (o), 3553 (P); CUT: *Sanford*, Aug. 15, 1917 (N), 2265 (P,M).

DULICHIUM ARUNDINACEUM (L.) Britton. Swampy hollows. NAU: 745 (W); PAS: 744 (W); NAS: *Northrop*, Aug. 1901 (Y), 2343 (N,P); CUT: *Sanford*, Aug. 15, 1917 (N).

ELEOCHARIS PARVULA (R. & S.) Link. *Scirpus nanus* Spreng. See Svenson, RHODORA, XXXI. 168 (1929). Brackish ponds and salt marshes. NON: 2287 (P,M), 2708 (N,P); UNC: 3050 (P); NAU: 1804 (N); NAS: *Pennell* 2924 (W).

E. OBTUSA (Willd.) Schultes. Moist hollows and pond margins. NON: 2574 (P,M), 3204 (N,P); NAS: *Northrop*, Aug. 1901, labelled "*C. ovata*" (Y); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 485 (W).

E. ACICULARIS (L.) R. & S. Peaty and sandy pond borders: apparently not common. NON: 2913 (N,P); NAU: 2507 (N,P,M); PEN: *Jordan* (o).

E. SMALLII Britton. See Fernald & Brackett, RHODORA, XXXI. 57–77 (1929). Peaty and boggy pond margins and low swampy areas. UNC: 3002 (N,P); NAS: 3498 (N,P,M,C); CUT: 746 (P,W); PEN: 849 (P,W).

E. UNIGLUMIS (Link.) Schultes. See Fernald & Brackett, l. c. 71. This essentially boreal sedge is near the extreme southern limit of its range on Cuttyhunk where, on August 11, 1927, it was collected from the peaty margin of Sheep Pond. CUT: 2526 (N).

E. UNIGLUMIS (Link) Schultes, var. HALOPHILA Fernald & Brackett, l. c. 72. Sandy or peaty margins of brackish ponds; rather frequent. NON: 2703 (N,P,M,C), 2912 (P,M); NAU: 1028 (N,P,W), 3316 (P); NAS: *Williams*, July 10, 1911 (N), 1029 (P,W).

E. ROSTELLATA Torr. Apparently infrequent. Seen only from a low brackish marsh along the north shore of Naushon near Kettle Cove. NAU: 3878 (N,P,M,C).

FIMBRISTYLIS AUTUMNALIS (L.) R. & S. *F. Frankii* Steud. See Blake, RHODORA, XX. 25 (1918). Grassy pond borders. NON: 3199 (N,P); NAU: 2738 (N,P).

SCIRPUS AMERICANUS Pers. Everywhere bordering ponds, both fresh and saline. NON: 2239 (P), 2888 (M); UNC: 2998 (P), 3025 (N); NAU: 2375 (P), 2921 (N), 2923 (P), 2723 (P,C); NAS: *Northrop*, Aug. 1901 (Y), *Pennell* 2910 (W), *Williams*, July 10, 1911 (N), 2355 (P,M); CUT: *Sanford*, Aug. 15, 1917 (N), 2277 (P,M); PEN: 486 (P,W).

S. OLNEYI Gray. Seen growing at edge of salt marsh along south shore of Nonamesset; probably more general. NON: 2898 (N,P); NAS: *Northrop*, Aug. 1901 (Y).

S. VALIDUS Vahl. Common in wet depressions and swampy borders of ponds. NON: 2244 (N,P); UNC: 2999 (N,P); NAU: 1033 (P,W); NAS: *Northrop*, as "*S. lacustris*" (o); CUT: 3573 (P); PEN: 488 (N,P,W,M).

S. ROBUSTUS Pursh. Not common. NAS: *Northrop*, Aug. 1901 (Y)

S. CAMPESTRIS Britton, var. PALUDOSUS (A. Nelson) Fernald. Occasional in brackish marshes. NON: 2288 (P,M), 3209 (N,P); PEN: 487 (N,P,W,M,C).

S. CAMPESTRIS Britton, var. NOVAE-ANGLIAE (Britton) Fernald. Collected only from swampy clearing in woods near Job's Neck. NAU: 3154 (N,P).

S. CYPERINUS (L.) Kunth. Everywhere in wet depressions and around ponds. NON: 2566 (N,P), 3169 (P,M); UNC: 2990 (N,P); NAU: 2922 (N,P,M), 3149 (P); PAS: *Svenson*, Sept. 8, 1926 (N), 3791 (C); NAS: *Northrop* (o), 2340 (N,P); CUT: 2308 (N,P).

S. CYPERINUS (L.) Kunth, var. PELIUS Fernald. Found only along the edge of a swamp near Tarpaulin Cove. NAU: 2395 (N).

ERIOPHORUM TENELLUM Nutt. Occasional in boggy situations. NAU: *Pennell* 2905 (P); NAS: *Northrop*, Aug. 1901, labelled "*E. gracile*" (Y); CUT: 1030 (N).

E. VIRGINICUM L. Rather frequent in open bogs and wet peaty hollows. NON: 2879 (N,P,M), 3180 (P); PAS: 3792 (N,P), *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop* (o), 3497 (P); CUT: *Sanford*, Aug. 15, 1917 (N), 1014 (P,W), 2517 (P,C).

RYNCHOSPORA FUSCA (L.) Ait. f. Apparently rare; seen only in a low, boggy hollow near Tarpaulin Cove. NAU: 2512 (P,W).

R. ALBA (L.) Vahl. Open bogs and peaty depressions; seemingly not abundant, although plentiful in an extensive bog at the west end of Cuttyhunk. NAS: *Northrop*, Aug. 1901 (Y); CUT: 2319 (N,P).

R. CAPITELLATA (Michx.) Vahl. *R. glomerata* of Manual in part. See Blake, RHODORA, XX. 25 (1918). Much more common than the preceding. Bogs, pond-holes and pond borders. NON: 2644 (N); UNC: 3014 (N,P), 3116 (P,M,C); NAU: 2393 (N); PAS: 1782 (N,P); NAS: 3471 (P).

MARISCUS MARISCOIDES (Muhl.) Kuntze. *Cladium mariscoides* Torr. See RHODORA, XXV. 49 (1923). Mostly on sandy beaches bordering ponds. NAU: 2924 (N); PAS: 3776 (P); NAS: *Pennell* 2917 (W), 2339 (N); CUT: 740 (P,W).

Carex scoparia Schkuhr. Not common on the Elizabeth Islands. Dryish border of small pond. NON: 3384 (N,P,M,C); PEN: Jordan (o).

C. scoparia Schkuhr, var. subturbinata Fernald & Wiegand. Rhodora xiv. 115 (1912). Seen around margin of *Decodon* swamp near Tarpaulin Cove. NAU: 2399 (N).

C. Longii Mackenzie. C. *albolutescens* of Manual. See Mackenzie, Bull. Torrey Bot. Club, xlix. 372 (1922). Frequent in open grassland. UNC: 3078 (N), 3099 (P); NAS: 3469 (P); CUT: *Sanford*, Aug. 15, 1917 (N), 1013 (N,P,W,M); PEN: 848 (N,P,W).

C. straminea Willd. This is the plant with obovate perigynia selected by Mackenzie as true *C. straminea;* see Bull. Torrey Bot. Club, xlii. 603 (1915). It has been found growing only on the edge of a bog at the west end of Cuttyhunk. CUT: 2327 (N,P).

C. hormathodes Fernald. Moist, occasionally brackish, situations as well as dry slopes near shores. NON: 2297 (N); UNC: 3644 (P); NAS: *Williams*, July 10, 1911 (N); CUT: 726 (P,W); PEN: 1754 (N,P).

C. silicea Olney. Dry, sandy banks and hillsides. PAS: 1780 (N,P); CUT: 2258 (N), 2267 (P,M,C); PEN: 1497 (P), 1498 (N,P,W).

C. alata Torr. Plentiful around edge of an extensive boggy area near the center of Nashawena. NAS: 2486 (N,P).

C. festucacea Schkuhr. This is the small-fruited sedge retained by Mackenzie as genuine *C. festucacea.* See Bull. Torrey Bot. Club, xlii. 604 (1915). Apparently rare and local on the islands. NAU: 736 (N,P).

C. Howei Mackenzie. *C. scirpoides,* var. *capillacea* (Bailey) Fernald. See Mackenzie, Bull. Torrey Bot. Club, xxxvii. 245 (1910). Abundant in boggy woods and pond borders. NON: 2654 (N,P,M), 2659 (P), 3377 (C), 3299 (P); NAU: 728 (W), 1018 (P,W), 1088 (P,W); NAS: *Pennell* 2922 (W), 3542 (N,P); CUT: 727 (P,W).

C. incomperta Bicknell. Bull. Torrey Bot. Club, xxxv. 494 (1908). NAU: *Pennell* 2907 (G,W).

C. seorsa E. C. Howe. Seen growing only in a boggy wooded hollow on the south shore of Nonamesset. NON: 3379 (N,P).

C. cephalantha (Bailey) Bicknell. *C. stellulata,* var. *cephalantha* (Bailey) Fern. See Bull. Torrey Bot. Club, 1. 346 (1923). Boggy woods at east end of Nashawena. NAS: 3643 (P).

C. canescens L., var. disjuncta Fernald. Boggy woods and wet borders of ponds. NON: 3378 (N), 3398 (P); NAU: *Williams*, July 10, 1911 (N), 1019 (P,W).

C. brunnescens Poir., var. sphaerostachya (Tuckerm.) Kükent. See Fernald, Rhodora, xxviii. 162 (1926). Rare. Boggy hollow in woods at east end of Naushon, NAU: 2480 (P,W).

C. rosea Schkuhr, var. radiata Dewey. Apparently local. Collected in dry sandy woods at east end of Naushon. NAU: 2475 (P,W).

C. contigua Hoppe. *C. muricata* of most American authors. See Mackenzie, Bull. Torrey Bot. Club, 1. 236 (1923). Dry, open, sandy ground. NAU: 734 (P,W); CUT: 2283 (N,P), *Taylor* 2413 (P); PEN: 484 (P,W).

C. MUHLENBERGII Schkuhr. Rather frequent on exposed downs and in sandy clearings. NON: *Pennell* 2838 (W), 2245 (N), 3361 (P,M); NAU: 733 (W).

C. CEPHALOPHORA Muhl. Sandy oak and beech woods; local. NON: 2594 (N,P,W); NAU: 2463 (P).

C. VULPINOIDEA Michx. Wet depressions. NAU: 2394 (N,P,M, C); NAS: 3485 (N).

C. LAEVIVAGINATA (Kükent.) Mackenzie. See Britton & Brown, Ill. Fl. ed. 2, i. 371. (1913). Low, wet hollows; local. NAS: 3473 (P); CUT: 2281 (N).

C. CRINITA Lam. Swampy and boggy depressions. NAU: 723 (W); 2398 (P), 2936 (N); NAS: 3475 (P).

C. MITCHELLIANA Curtis. See Weatherby, RHODORA, XXV. 17 (1923). Rare on the Elizabeths. NAS: *Pennell* 2921, labelled "*C. crinita*" (W).

A species of the southern coastal plain ranging north to Cape Cod and Plymouth County.

C. VIRESCENS Muhl. Boggy woods; rare and local. NAU: 1020 (P,W), 3141 (N,P,M).

C. SWANII (Fernald) Mackenzie. Bull. Torrey Bot. Club, xxxvii. 246 (1910). *C. virescens*, var. *Swanii* Fernald. Dry, open ground and sandy woods. NON: 2588 (N,P), 3354 (P,C); NAU: *Pennell* 3132 (W), 3680 (N); CUT: 1012 (N,P,W,M), 3452 (P).

C. COMMUNIS Bailey. Dry, sandy beech woods; rare. NAU: 3324 (N,P).

C. VARIA Muhl. Sandy clearings, exposed knolls and hillsides; widespread. Some of the material approaches the scarcely separable forma *colorata* (Bailey) Kükent. NON: 3284 (N,P,C), 3300 (N,P), 3301 (P), 3285 (P); NAU: 3322 (N,P); NAS: 2361 (N,P,W,M).

C. PENNSYLVANICA Lam. Sandy banks and open grassland. NON: 3283 (N,P), 3353 (P,C); NAU: 3321 (N,P,M).

C. PENNSYLVANICA Lam., var. SEPARANS Peck in E. C. Howe, N. Y. State Mus. 48 Ann. Rep. 174 (1896). Var. *lucorum* (Willd.) Fernald. Seen only in dry beech woods at east end of Naushon. NAU: 2476 (P,W,M,C).

C. LIMOSA L. A far northern sedge which reaches the southern limit of its coastwise distribution in a bog at the west end of Cuttyhunk. CUT: 2311 (N,P,W).

C. DIGITALIS Willd. Apparently not common; sandy beech woods near Hadley Harbor. NAU: 2461 (P), 3323 (N,P).

C. DEBILIS Michx., var. RUDGEI Bailey. Collected only in a moist hollow on the hillsides of Cuttyhunk. CUT: 1011 (P).

C. LANUGINOSA Michx. Peaty margin of a slightly brackish pond at the extreme west end of Nashawena. NAS: 3500 (N,P).

C. COMOSA Boott. Swampy clearings and wet depressions; locally abundant. NON: 2905 (N,P); CUT: *Sanford*, Aug. 15, 1917 (N), 722 (W).

C. LURIDA Wahlenb. Pond borders and moist hollows. UNC: 2989 (N,P), 3646 (P,C); NAU: 2385 (N,P,M); NAS: 3474 (N,P).

C. LUPULINA Muhl. Boggy clearings and low moist situations. NAU: 2486 (N,P), 3882 (P,M,C); PAS: 519 (P,W); CUT: 731 (P,W).

ARACEAE

ARISAEMA TRIPHYLLUM (L.) Schott. This seems to be the only *Arisaema* on the islands. It is abundant in the boggy and swampy woods at the east end of Naushon, and in similar situations on Nashawena. NAU: 752 (N), 3133 (W), 3317 (P,M,C), 3331 (P); NAS *Northrop* (o), 3528 (N,P).

SYMPLOCARPUS FOETIDUS (L.) Nutt. Seen only in a low swampy area at the extreme west end of Nashawena. NAS: *Northrop* (o), 3496 (N,P).

ACORUS CALAMUS L. Wet grassy hollows and swampy pond borders; locally abundant. NAS: *Northrop* (o), 3565 (P); CUT: 2282 (N).

LEMNACEAE

LEMNA MINOR L. Occasional in small ponds in clearings. NAU: 2376 (N,P).

ERIOCAULACEAE

ERIOCAULON SEPTANGULARE With. *E. articulatum* (Huds.) Morong. Sandy and peaty pond margins. NAU: *Pennell* 3118 (P), 2508 (P,M), 2942 (N); NAS: *Northrop*, Aug. 1901 (Y).

XYRIDACEAE

XYRIS CAROLINIANA Walt. Apparently not sommon. Sandy beach bordering West End Pond, Naushon. NAU: 2919 (N,P); NAS: *Northrop*, Aug. 1901 (Y).

X. TORTA Smith. *X. flexuosa* Muhl. Reported by Mrs. Northrop from Nashawena; no specimen seen.

PONTEDERIACEAE

PONTEDERIA CORDATA L. Collected only in swampy border of dune ponds on Nashawena. NAS: *Northrop* (o), 2368 (N,P), 3547 (P).

JUNCACEAE

JUNCUS BUFONIUS L. Moist sandy or peaty soil. NAS: *Northrop*, Aug. 1901 (Y), *Williams* 1279 (N), *Pennell* 2918 (W), 3467 (P,M); CUT: 3575 (N,P).

J. GERARDI Loisel. Brackish areas; general. NON: 2877 (N); PAS: 1779 (P); NAS: *Northrop*, Aug. 1901 (Y); CUT: 2276 (N,P,M, C); PEN: 1094 (P,W), 1753 (N,P).

J. TENUIS Willd. Common everywhere; dry woods, gravelly shores, sandy paths and open fields. NON: 3191 (N); UNC: 3645 (P); NAU: 3136 (N); NAS: *Northrop*, Aug. 1901 (Y), 3468 (P); CUT: 3441 (N,P,M); PEN: 492 (P,W), 3400 (P).

Much of the material which has been collected can not satisfactorily be referred here, but is being held pending a critical comparison of our American *J. tenuis* with Old World collections, a comparison which may necessitate a careful revision of the entire species. The preceding few numbers are, however, cited as fairly typical.

J. TENUIS Willd., var. WILLIAMSII Fernald. This phase, with strongly divergent floriferous branchlets, has been met with occasionally. NAU: 2400 (N), 2710 (P,M).

J. DICHOTOMUS Ell. NAU: 1800 (P,W), 3162 (P); PEN: 1756 (N,P,W).

Under this heading is grouped a large series of variations, of which the variety *platyphyllus*, perhaps specifically distinct, represents only one trend. This matter is under consideration at present, and, until the species can be completely studied and revised, a few numbers only, out of an extensive series of collections, are cited.

J. DICHOTOMUS Ell., var. PLATYPHYLLUS Wiegand. PAS: 1781 (P); CUT: 1039 (P).

J. GREENEI Oakes & Tuckerm. This is one of the commonest plants of the dry open hillsides, being found on all of the islands. NON: 2247 (N,P,M,C), UNC: 3130 (P); NAU: 766 (P,W), 1802 (P); PAS: 765 (W); NAS: *Northrop*, Aug. 1901 (Y), 2362 (N); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 491 (N,P,W,M).

J. EFFUSUS L., var. COSTULATUS Fernald. RHODORA, xxiii. 239 (1921). Abundant in wet hollows and around ponds. NON: 2303 (P,M,C), 2567 (N,P); NAU: 2397 (P); PAS: *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop*, Aug. 1901 (Y), *Williams*, July 10, 1911 (N), 1767 (N,P), 2347 (P); CUT: 2320 (N,P,M); PEN: 852 (P,W).

J. EFFUSUS L., var. SOLUTUS Fernald & Wiegand. RHODORA, xii. 81 (1910). Collected by the writer only in a boggy hollow in woods near Tarpaulin Cove. NAU: 2883 (N,P,M,C); NAS: *Northrop*, Aug. 1901, on sheet with var. *costulatus* (Y).

J. CANADENSIS J. Gay. Abundant in moist depressions and around ponds. UNC: 2994 (P); 3114 (N,P,C); NAU: 2918 (N,P,M); PAS: 3778 (P); NAS: *Northrop*, Aug. 1901 (Y); CUT: *Sanford*, Aug. 15, 1917 (N).

J. PELOCARPUS Mey. Sandy shores and sandy or peaty pond borders. NON: 2638 (P), 3203 (N); NAU: 1042 (W), 2379 (P),

2724 (M,C), 2925 (N,P); PAS: 3780 (P); NAS: *Northrop*, Aug. 1901 (Y); PEN: *Jordan* (o).

J. MILITARIS Bigel. Sandy and swampy pond margins. NAU: 1038 (P), 2917 (N,P); NAS: *Northrop*, Aug. 1901 (Y), *Williams*, July 10, 1911 (N), *Pennell* 2915 (P,W), 1037 (P,W).

J. ACUMINATUS Michx. Abundant in wet depressions and on boggy or peaty borders of small ponds in open hills. NON: 2242 (P,C), 2704 (N), 3163 (N,P,M); UNC: 2995 (N,P); NAU: 1041 (P,W), 2391 (N,P); PAS: 757 (W); NAS: *Northrop*, Aug. 1901 (Y), *Pennell* 2909 (W); CUT: 3442 (P); PEN: 489 (N,P,W,M), 1757 (P,W).

J. ARTICULATUS L. Occasional in boggy depressions. PEN: 490[1] (P), 1499 (W).

J. ARTICULATUS L., var. OBTUSATUS Engelm. Peaty, usually brackish, hollows. NAU: 3866 (N); CUT: 3574 (N,P).

J. MARGINATUS Rostk. Muddy borders of ponds. UNC: 3117 (N); NAU: 2390 (N,P,M), 2731 (P); PAS: 3779 (P); NAS: *Northrop*, Aug. 1901 (Y), 3562 (N).

LUZULA CAMPESTRIS (L.) DC., var. MULTIFLORA (Ehrh.) Čelak. Sandy bank at east end of Nonamesset. NON: 3369 (N).

L. CAMPESTRIS (L.) DC., var. ECHINATA (Small) Fernald & Wiegand. RHODORA, XV. 38 (1913). Collected only in sandy beech woods on Naushon. NAU: 3325 (N,P).

LILIACEAE

UVULARIA PERFOLIATA L. Reported by Mrs. Northrop for Nashawena; no specimen seen.

OAKESIA SESSILIFOLIA (L.) Wats. Seen in a boggy, wooded hollow along the south shore of Nonamesset. NON: 3295 (N,P); NAS: *Northrop* (o).

LILIUM PHILADELPHICUM L. Reported by Mrs. Northrop from Nashawena and said by wife of caretaker there to grow abundantly at certain localities on the island today; no specimens seen.

L. tigrinum Ker. Found persisting around leper cottages on Penikese. PEN: 494 (P,W).

Asparagus officinalis L. In sandy soil near areas under cultivation. NAS: *Northrop* (o); PEN: 493 (N,P,W).

MAIANTHEMUM CANADENSE Desf. Abundant in boggy wooded hollow along south shore of Nonamesset. NON: 3296 (N); NAS: *Northrop* (o).

MEDEOLA VIRGINIANA L. Boggy woodland on Nonamesset and edge of brackish marsh at east end of Naushon. NON: 3337 (P); NAU: 3332 (N); NAS: *Northrop* (o).

SMILAX ROTUNDIFOLIA L. Rather abundant in thickets and wet, overgrown hollows. NON: 2296 (N,P); UNC: 3044 (N); NAS: *Northrop* (o); PEN: 495 (W).

[1] This is the material erroniously reported from Penikese as *J. debilis* Gray in RHODORA, XXVI. 223 (1924).

S. HERBACEA L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

S. GLAUCA Walt., var. LEUROPHYLLA Blake. See RHODORA, XX. 78 (1918). Known only on basis of Mrs. Northrop's collection from Nashawena. NAS: *Northrop*, "July-Aug." 1901 (Y).

AMARYLLIDACEAE

HYPOXIS HIRSUTA (L.) Coville. Abundant on open, sandy slopes and knolls at west end of Cuttyhunk. NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N); 2310 (P).

IRIDACEAE

IRIS VERSICOLOR L. Wet depressions and pond borders; abundant. NON: 2678 (N); UNC: 3031 (P), 3121 (N); NAS: *Northrop* (o), 2357 (N); PEN: 496 (P,W).

I. PRISMATICA Pursh. Apparently not common; reported and collected by Mrs. Northrop from Nashawena. NAS: *Northrop*, "July-Aug." 1901 (Y).

SISYRINCHIUM ANGUSTIFOLIUM Mill. Seen growing only in dry sand along east shore of Penikese, where fairly plentiful. NAS: *Northrop* (o); PEN: 497 (P,W).

S. GRAMINOIDES Bicknell. *S. gramineum* Curtis, not Lam. Grassy slopes and pond borders. NON: 2300 (P), 3360 (N,P); CUT: 3449 (N,P,C); PEN: 3408 (N,P,M), 3415 (P).

S. ATLANTICUM Bickn. Wet hollows, open slopes and bogs. UNC: 3081 (P); CUT: 771 (W), 2318 (N,P,M,C), *Hervey* (N); PEN: 3401 (P).

ORCHIDACEAE

HABENARIA BRACTEATA (Willd.) R. Br. Reported by Mrs. Northrop as "common in meadow" on Nashawena; no specimen seen. NAS: Northrop (o).

This is one of the surprises of the Northrop list. It is hard to believe that the compiler could have confused this species of the damp upland woods with *H. clavellata*, *H. blephariglottis* or *H. lacera*, all of which she likewise reported and the first two of which are represented by specimens at the New York Botanical Garden. It is greatly to be regretted that she did not also collect *H. bracteata*. As it is, however, there seems no course but to let this record stand.

H. CLAVELLATA (Michx.) Spreng. Open bogs, boggy pond borders and wet, peaty depressions. NAS: *Northrop*, July 1901 (Y), 3540 (N,P); CUT: *Sanford*, Aug. 15, 1917 (N), 2527 (P.)

H. ORBICULATA Torr. NAU: *MacRae*, July 25, 1904 (N).

Collected by Lillian J. MacRae on Naushon, July 25, 1904. Specimen originally in the local herbarium at Woods Hole but since

transferred to the collections of the New England Botanical Club. This, like *H. bracteata*, constitutes another remarkable addition to the flora of southeastern Massachusetts, for this plant has not previously been reported from nearer than Norfolk County.

H. BLEPHARIGLOTTIS (Willd.) Torr. Apparently rare; known only from Mrs. Northrop's collection on Nashawena. NAS: *Northrop*, Aug. 1901 (Y).

H. LACERA (Michx.) R. Br. Swampy and boggy hollows. NAU: 2606 (N); PAS: 1787 (P); NAS: *Northrop* (o); CUT: 2315 (P), 3576 (N).

POGONIA OPHIOGLOSSOIDES (L.) Ker. Locally abundant in open peaty and boggy depressions. PAS: 1789 (P); NAS: *Northrop* (o), *Williams*, July 10, 1911 (N); CUT: 524 (W).

CALOPOGON PULCHELLUS (Sw.) R. Br. Not infrequent; usually with the preceding. PAS: 1788 (N,P); NAS: *Northrop* (o); CUT: 523 (W).

ARETHUSA BULBOSA L. Mrs. Northrop reports this from Nashawena with the comment "quite common in some places." Unfortunately, no specimen is extant, but there seems to be no good reason for questioning this record. NAS: *Northrop* (o).

SPIRANTHES BECKII Lindl. Rare; seen only on dry hillside west of French Watering Place. NAU: 2946 (N).

S. GRACILIS (Bigel.) Beck. Dry, grassy, open slopes; fairly abundant. NON: 2622 (N); NAU: 2601 (N); NAS: *Northrop*, Aug. 1901 (Y).

S. CERNUA (L.) Richard. Local; wet, peaty hollows. UNC: 3024 (N,P); NAU: *Cushman & Morse*, Aug. 25, 1906 (B).

LIPARIS LOESELII (L.) Richard. Local; Mrs. Northrop's comment is "moist hollow in face southern cliffs." Taylor's sheet is from border of Sheep Pond. NAS: *Northrop*, Aug. 1901 (Y); CUT: *Taylor*, July 15, 1919 (N).

TIPULARIA DISCOLOR (Pursh) Nutt. This rare orchid, hitherto known on the islands of Massachusetts[1] only from an old collection on Martha's Vineyard, is listed by Mrs. Northrop from Nashawena as "quite common in 3 or 4 localities, c. & ne. part island." Fortunately, in this instance a specimen was preserved and is now in the herbarium of the New York Botanical Garden. NAS: *Northrop*, Aug. 1901 (Y).

SALICACEAE

[SALIX AMYGDALOIDES Andersons. Appears on Mrs. Northrop's Nashawena list. This record probably refers to *S. alba* or some other willow and, in the absence of material, can scarcely be admitted.]

S. pentandra L. Introduced on Naushon and Penikese; apparently thriving on latter island. NAU: 3873 (P); CUT: 590 (N,P,W,M,C).

S. alba L. × ? This hybrid, probably *S. alba* × *fragilis*, is abund-

[1] See Fogg, RHODORA, xxxii. 114 (1930).

ant around a small freshwater pond on Penikese. PEN: 591 (N,P,W, M).

S. DISCOLOR Muhl. Reported by Jordan from Penikese; no specimen.

Populus alba L. In boggy woods near farmhouse on Nashawena and around dwellings on Penikese. NAS: *Northrop* (o), 3511 (P); PEN: 499 (N,P,W).

P. TACAMAHACCA Mill. *P. balsamifera* of most American authors. See Sargent, Jour. Arn. Arb. i. 61 (1919). Reported by Mrs. Northrop for Nashawena; no specimen seen.

P. BALSAMIFERA L. *P. deltoides* Marsh. See Sargent, Jour. Arn. Arb., i. 62 (1919). Small clump near landing on Penikese. PEN: 500 (P,W).

MYRICACEAE

MYRICA GALE L. Only locally abundant, as around dune ponds on Nashawena. NAU: *Williams*, July 10, 1911 (N); NAS: *Northrop* (o), 1773 (N,P,W,M).

M. CAROLINIENSIS Mill.[1] A common shrub on the Elizabeths; thickets, pond margins, and sheltered hollows in open hills. NON: 2237 (N,P); UNC: 2951 (N); PAS: 1783 (N,P,W); NAS: *Northrop* (o), 2342 (N); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 498 (N,P,W).

JUGLANDACEAE

JUGLANS CINEREA L. On Mrs. Northrop's list for Nashawena; no specimen seen.

CARYA ALBA (L.) Koch. Occasional in mixed woods. UNC: 2454 (N,P); NAU: 777 (P,W); NAS: *Northrop* (o).

BETULACEAE

CORYLUS CORNUTA Marsh. *C. rostrata* Ait. Reported by Mrs. Northrop for Nashawena; no specimen seen.

OSTRYA VIRGINIANA (Mill.) K. Koch. An important constituent of the native woods, especially on Nonamesset and Naushon. NON: 2593 (N); NAU: 779 (P,W); NAS: *Northrop* (o).

BETULA LUTEA Michx. Mrs. Northrop reports two specimens near Choptauk Lake, Nashawena; no material seen.

B. POPULIFOLIA Marsh. Bordering woods and in protected hollows, where it often forms dense thickets. NON: 2635 (N,P,M); UNC: 3043 (N,P); NAS: *Northrop* (o); PEN: Jordan (o).

B. pendula Roth. Planted and established near eastern end of Naushon. NAU: 2471 (N,P).

B. pubescens Ehrh. *B. alba*, var. *pubescens* Spach. With the last. NAU: 2472 (N,P,M).

[1] This was the original spelling employed by Miller, Gard. Dict. ed. 8 (1768) and not *carolinensis*, as usually given.

FAGACEAE

FAGUS GRANDIFOLIA Ehrh. The most important tree on the islands. Forms a pure stand over large areas on Naushon and Nonamesset, and occurs mixed with other trees on these two islands as well as parts of Uncatena and Nashawena. When growing in the heavier woods this tree apparently does not form fruit, but an occasional isolated specimen in the open will be found laden with nuts. NON: 2592 (N); NAU: 3147 (N); NAS: *Northrop* (o), 3532 (P,M).

F. GRANDIFOLIA Ehrh., forma PUBESCENS Fernald & Rehder. See Rehder, RHODORA, ix. 111 (1907). Occasional with the species. UNC: 3125 (N); NAU: 3137 (P), 3693 (N,P).

QUERCUS ALBA L. Abundant; dry sandy woods. NON: 2657 (P); UNC: 3127 (N); NAS: *Northrop* (o), 3531 (P).

Q. RUBRA L. A single tree near landing on Penikese, where possibly introduced. PEN: 592 (N,P,W).

Q. VELUTINA Lam. Next to the Beech the most important constituent of the wooded areas. NON: 2656 (N), 3309 (P,M), 3916 (P); UNC: 3126 (P); NAU: 780 (P,W), 3880 (P); NAS: *Northrop* (o), 3530 (N,P).

[Q. MARILANDICA Moench is reported from Nashawena by Mrs. Northrop but is not represented by a specimen. The Black Jack Oak is unknown northeast of Long Island and it seems probable that this record refers to some other species, possibly a sapling of *Q. velutina*.]

URTICACEAE

ULMUS AMERICANA L. Reported by Mrs. Northrop from Nashawena, no specimen seen.

Urtica urens L. Listed by Mrs. Northrop as growing "about houses" on Nashawena; no specimen seen.

BOEHMERIA CYLINDRICA (L.) Sw. Moist woods and pond borders. Extremely variable and its relation to the variety *Drummondiana* not clearly understood. An extensive series has been collected and is being held for further study. The following is typical. NAU: 3151 (N,P,M,C); NAS: *Northrop* (o).

B. CYLINDRICA (L.) Sw., var. DRUMMONDIANA Weddell. Var. *scabra* Porter. See Fernald, RHODORA, xii. 10 (1910). Borders of salt marshes; perhaps distinct from var. *Drummondiana* of the south Atlantic states. CUT: 2523 (N).

POLYGONACEAE

RUMEX BRITANNICA L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

R. crispus L. Waste places and pond margins; often appearing indigenous. NAS: *Northrop* (o); PEN: 598 (N,P,W,M), 3399 (P).

R. obtusifolius L. Occasional; the Nashawena collection was made from the swampy margin of thick woods. NAS: *Northrop* (o), 3566 (N); PEN: *Jordan* (o).

R. VERTICILLATUS L. Swampy margin of woods at east end of Nashawena with the last. NAS: *Northrop* (o), 3529 (N).

This and Block Island are the only stations for the plant in southeastern New England.

R. MARITIMUS L., var. FUEGINUS (Phil.) Dusén. *R. persicaroides*, in part, of the Manual. See St. John, RHODORA, xvii. 73 (1915). Brackish situations or muddy pond borders. NAU: 2372 (N,P); PEN: *Moore* 1917 (N), 450 (P,W).

R. Acetosella L. Exposed knolls, slopes and sandy clearings. NAS: *Northrop* (o); CUT: 2262 (N); PEN: 597 (N, P, W).

POLYGONUM GLAUCUM Nutt. *P. maritimum* of Manual. See Fernald, RHODORA, xv. 69 (1913). Sand and cobble beaches. NON: 2868 (P); UNC: 3051 (N); NAU: *Cushman & Morse*, Aug. 25, 1906 (B), *Williams*, July 10, 1911 (N); NAS: *Northrop*, Aug. 1901 (Y).

P. AVICULARE L. Sandy patches; not common. NAS: *Northrop* (o); PEN: 594 (P,W).

P. PENSYLVANICUM L. Not common; borders of small ponds. UNC: 2987 (N).

P. PENSYLVANICUM L., var. LAEVIGATUM Fernald. RHODORA, xix. 70 (1917). Moist situations; local. PAS: *Svenson*, Sept. 8, 1926 (N).

P. HYDROPIPER L., var. PROJECTUM Stanford. RHODORA, xxix. 86 (1927). Seen only from margin of small pond near east end of Nonamesset. NON: 3202 (N).

P. PUNCTATUM Ell. *P. acre* HBK. See Stanford, RHODORA, xxix. 77 (1927), where, in a footnote, reason is given for attributing priority to *P. punctatum* over *P. acre*. Pond borders, margins of swamps and wet situations generally. NON: 2893 (N,P,M), 2699 (P,M,C); UNC: 2986 (N,P), 3018 (P); NAU: 2371 (P), 2460 (P,C), 3150 (N,P,M); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 593 (N,P,W).

P. *Persicaria* L. Pond margins and moist depressions. UNC: 3017 (N); PAS: *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop* (o); PEN: 596 (N,P,W,M).

P. HYDROPIPEROIDES Michx. Apparently not common. PAS: *Svenson*, Sept. 8, 1926 (N).

P. OPELOUSANUM Riddell, var. ADENOCALYX Stanford. See RHODORA, xxviii. 28 (1926). Pond borders. NON: 3207 (P); PAS: 3747 (N,P).

P. Convolvulus L. Trailing over thicket and low growth surrounding pond. PEN: 595 (N,P,W,M,C).

P. SCANDENS L. Covering scrub growth in swampy hollows. NON: 3172 (N,P); UNC: 3038 (N,P).

P. DUMETORUM L. This species, with smaller fruit than the preceding, was found only on Pine Island, Nonamesset, where it formed a dense tangle over the other vegetation on the beach. NON: 3912 (N,P).

CHENOPODIACEAE

Chenopodium album L. Beaches and exposed sandy areas. UNC: 2956 (N); NAS: *Northrop* (o); CUT: *Pennell* 2993 (P); PEN: 1401 (P,W).

ATRIPLEX ARENARIA Nutt. Sea beaches; not abundant. UNC: 3106 (N); PAS: 1793 (N,P), 3756 (P,M); NAS: *Northrop* (o); PEN: *Jordan* (o).

A. PATULA L., var. HASTATA (L.) Gray. One of the commonest plants of the sea beaches and disturbed sandy areas near the shore. UNC: 2978 (N,P); PAS: 1791 (N,P); NAS: *Northrop* (o), 3502 (P); CUT: *Pennell* 2996 (P), 2272 (N); PEN: 1400 (P,W), 3386 (M,C).

SALICORNIA MUCRONATA Bigel. Salt marsh areas; less frequent than the two following. NAU: *Pennell* 3146 (W); PAS: *Svenson*, Sept. 8, 1926 (N).

S. EUROPAEA L. Salt marshes and brackish mud flats. NON: 2892 (N); UNC: 3094 (N,P); PAS: *Svenson*, Sept. 8, 1926 (N); 3742 (P); NAS: *Northrop* (o); CUT: 3570 (N,P); PEN: *Jordan* (o).

S. AMBIGUA Michx. Same situations as last. NAU: *Pennell* 3112 (P), *Pennell* 3145 (W); PAS: *Svenson*, Sept. 8, 1926 (N), 3741 (N,P); CUT: 3571 (N,P,M,C).

SUAEDA MARITIMA (L.) Dumort. Reported by Jordan from Penikese; no specimen.

S. LINEARIS (Ell.) Moq. Salt marshes and brackish muds. UNC: 2963 (P,W), 3076 (N); PAS: 3739 (N,P); CUT: 3567 (P,M,C).

SALSOLA KALI L. Beaches and brackish marshes. NON: 2286 (N,P); NAU: *Cushman & Morse*, Aug. 25, 1906 (B), 3886 (P); NAS: *Northrop* (o), 2364 (N); CUT: 2273 (P); PEN: *Jordan* (o).

S. KALI L., var. CAROLINIANA (Walt.) Nutt. With the last; less abundant. UNC: 2961 (P), 3075 (N,P); PAS: 1792 (N,P).

AMARANTHACEAE

Amaranthus retroflexus L. Dry sandy soil near cultivated area. PEN: 1402 (N,P,W,M).

PHYTOLACCACEAE

PHYTOLACCA AMERICANA L. *P. decandra* L. See RHODORA, xvii. 180 (1915). Apparently rare; seen growing only along edge of boggy depression at east end of Pasque. NAU: *Pennell* 3174 (W); PAS: 3785 (N).

AIZOACEAE

Mollugo verticillata L. Bare, grassy slopes and sandy patches. NON: 2891 (N); UNC: 3052 (N,P); NAS: *Northrop* (o), 3470 (P).

CARYOPHYLLACEAE

SPERGULARIA RUBRA (L.) J. & C. Presl. Dry exposed slopes and sandy clearings. NAS: *Northrop* (o), *Williams*, July 10, 1911 (N), 3465 (P,M); CUT: 3459 (P); PEN: 1410 (P,W).

S. SALINA J. & C. Presl. Sand and cobble beach along Northwest Gutter. Rare; represented on these islands usually by the next species. NAU: 3132 (N, W).

S. LEIOSPERMA (Kindb.) F. Schmidt. *S. marina* of Manual, in part. See Fernald & Wiegand, RHODORA, xii. 157 (1910). Sandy and cobbly beaches, mud flats and brackish marshes. NON: 2290 (N); UNC: 2962 (N,P,M); NAU: 2455 (N); PAS: 3738 (N,P,C); CUT: 3569 (N,P); PEN: 1409 (P,W).

Spergula arvensis L. Not common. NAS: *Northrop* (o); PEN: *Jordan* (o).

SAGINA PROCUMBENS L. Upper beaches and dry, gravelly banks. NON: 2692 (N,P); NAU: 2728 (N); NAS: *Northrop* (o), 3464 (P); PEN: 1408 (W).

ARENARIA LATERIFLORA L. Seen growing only in sandy thicket along north shore of Naushon near the east end. NAU: 3318 (N); NAS: *Northrop*, "July–Aug." 1901 (Y).

A. PEPLOIDES L., var. ROBUSTA Fernald. See RHODORA, xi. 109 (1909). Occasional on sandy or cobbly beaches. CUT: 2274 (N,P); PEN: 1403 (W).

A. serpyllifolia L. Sandy and gravelly areas; occasional. NON: *Pennell* 2840 (W); NAU: 3424 (N); NAS: *Northrop* (o).

Stellaria graminea L. Grassland on Penikese. PEN: 1411 (P,W); 1760 (N,P).

S. media (L.) Cyrill. Dry, sterile soil and grassland on Penikese; probably more widespread. PEN: 855 (W), 3395 (N, P).

Cerastium vulgatum L. Abundant on open, grassy hillsides and sandy clearings. NON: 3367 (N,P,M), 3286 (P); NAS: *Northrop* (o); CUT: 3438 (P); PEN: 1404 (N,P,W).

Agrostemma Githago L. Reported by Mrs. Northrop from Nashawena; no specimen.

Lychnis alba Mill. Occasional in grassland on Penikese. PEN: 1407 (W).

Gypsophila paniculata L. Persistent around leper cottages on Penikese. PEN: 1406 (P,W).

Dianthus barbatus L. Same situation as the preceding. PEN: 1405 (W).

D. Armeria L. Seen only on edge of wet hollow at west end of Cuttyhunk. CUT: 3445 (N,P).

PORTULACACEAE

Portulaca oleracea L. Sandy ground, usually near cultivated areas. NAS: *Northrop* (o); PEN: 1412 (W).

NYMPHAEACEAE

NYMPHOZANTHOS VARIEGATUS (Engelm.) Fernald. *Nymphaea advena*, var. *variegata* Fernald. See Fernald, RHODORA, xxi. 183 (1919).

Dune ponds on Nashawena and Sheep Pond, Cuttyhunk; possibly more general. NAS: *Northrop* (o), 2366 (N,P); CUT: 786 (W), 2531 (N).

NYMPHAEA ODORATA Ait. *Castalia odorata* Woodv. & Wood. See RHODORA, xviii. 161 (1916). Rather general in smaller ponds as well as Sheep Pond, Cuttyhunk. UNC: 3004 (P); NAU: 2734 (N); NAS: *Northrop* (o), 2367 (N,P); CUT: 2530 (N).

RANUNCULACEAE

RANUNCULUS CYMBALARIA Pursh. Sandy and gravelly shores; rather frequent. NON: 2302 (N,P); NAU: 528 (W,P); CUT: *Hervey*, no date, (N); PEN: *Northrop* (o), 1414 (W).

R. DELPHINIFOLIUS Torr. Small, grassy-bottomed ponds in open hills. NAS: *Northrop* (o), 3522 (P); PEN: 451 (P,W), 1759 (N,P,M).

[R. REPTANS L. appears on Mrs. Northrop's list. It is hard to say what this may refer to in the absence of a specimen. *R. reptans*, var. *ovalis* (*R. Flammula*, var. *reptans* of the Manual) is unknown from southeastern Massachusetts and it seems hardly justifiable to report it on the basis of such an ambiguous record.]

R. bulbosus L. Seen only on a steep gravel bank at the extreme east end of Nonamesset; possibly more abundant. NON: 3282 (N).

R. acris L. Rather common in open grassland, especially on outer islands. NAS: *Northrop* (o); CUT: 2325 (N); PEN: 1413 (N,P,W).

THALICTRUM REVOLUTUM DC. Reported by Mrs. Northrop as *T. purpurascens*, but had probably best be referred here. NAS: *Northrop* (o).

ANEMONE VIRGINIANA L. Collected in dry, sandy woods on "Captain's Island," Naushon. NAU: 3907 (P).

A. QUINQUEFOLIA L. Reported by Mrs. Northrop for Nashawena; no specimen seen.

COPTIS GROENLANDICA (Oeder) Fernald. *C. trifolia* of the Manual. See Fernald, RHODORA, xxxi. 136 (1929). Included in Mrs. Northrop's list with the comment "in one filled up pond under fern lvs. Very small, no fruit." NAS: *Northrop* (o).

This is an interesting addition to the flora of the islands. *Coptis* is unknown from Barnstable County, although represented in both Plymouth and Bristol Counties. Moreover, it is reported by Bicknell for Nantucket, where, as on Nashawena, it may be a remnant of a formerly more dominant continental flora. There seems to be no real reason, even in the absence of herbarium material, to discredit this record.

BERBERIDACEAE

Berberis Thunbergii DC. Occurs scattered over the open hills at the east end of Uncatena. UNC: 2975 (N).

LAURACEAE

SASSAFRAS OFFICINALE Nees & Eberm. *S. variifolium* (Salisb.) Ktze. See Blake, RHODORA, XX. 98 (1918). Scattered abundantly throughout all of the wooded areas. NAS: *Northrop* (o), 3533 (P).

S. OFFICINALE Nees & Eberm. var. ALBIDUM (Nutt.) Blake. RHODORA, XX. 98 (1918). Occasional with the species. UNC: 3123 (N).

BENZOIN AESTIVALE (L.) Nees. Reported by Mrs. Northrop from Nashawena; no specimen.

PAPAVERACEAE

Glaucium flavum Crantz. Established on beach near Tarpaulin Cove. NAU: 789 (P,W), 1798 (N).

CRUCIFERAE

Berteroa incana (L.) DC. Dry sandy soil near landing at east end of Pasque. PAS: 3798 (N,P,M).

LEPIDIUM VIRGINICUM L. Open grassland and low sandy stretches. UNC: 3056 (N,P); PAS: 3762 (P); NAS: *Northrop* (o); CUT: 2259 (N,P); PEN: 1417 (N,P,W,M,C).

Capsella Bursa-pastoris (L.) Medic. Occasional in disturbed situations. NAS: *Northrop* (o); PEN: 854 (P,W).

CAKILE EDENTULA (Bigel.) Hook. Sandy and cobbly sea beaches, especially outer islands. NAS: *Northrop* (o); CUT: 2271 (N); 3431 (P); PEN: 1416 (P,W).

Raphanus Raphanistrum L. Disturbed sandy soil near cultivated areas. NAS: *Northrop* (o); CUT: 2268 (N,P,M,C); PEN: 1418 (W).

R. sativus L. Same situations as last. PEN: 1419 (N,P,W).

Brassica juncea (L.) Cosson. On peninsula, east end of Penikese. PEN: 1415 (P,W).

B. nigra L. Dry, sandy slope. NAU: 790 (W); PEN: *Jordan* (o).

Sisymbrium officinale (L.) Scop., var. *leiocarpum* DC. Barren, sandy ground; waste places. PEN: (N,P,W,M).

S. altissimum L. Same situations as the preceding. PEN: 1420 (W).

Rorippa Nasturtium-aquaticum (L.) Schinz & Thel. *Radicula Nasturtium-aquaticum* Britt. & Rendle. Seen growing along a moist rill draining into Sheep Pond, Cuttyhunk. NAS: *Northrop* (o); CUT: 1054 (P,W).

DROSERACEAE

DROSERA ROTUNDIFOLIA L. Boggy situations and borders of ponds. NON: 2652 (N), 3362 (P); PAS: 1786 (N,P); NAS: *Northrop* (o), 3472 (P).

D. INTERMEDIA Hayne. *D. longifolia* of Manual. Apparently not common; borders of dune ponds on Nashawena. NAS: 1778 (N,P), *Northrop* (o), *Williams*, July 10, 1911 (N).

SAXIFRAGACEAE

RIBES HIRTELLUM Michx., var. CALCICOLA Fernald. See Fernald, RHODORA, xiii. 76 (1911). Seemingly rare. NON: 2844 (P).

HAMAMELIDACEAE

HAMAMELIS VIRGINIANA L. Dry to moist woodland and thickets. Some of this material approaches the variety *parvifolia* Nutt. NON: 2591 (N,P); NAU: 3152 (N,P); NAS: *Northrop* (o), 3512 (P).

ROSACEAE

SPIRAEA TOMENTOSA L. Pond borders and moist hollows; abundant. NON: 2564 (N); PAS: 1784 (N,P); NAS: *Northrop* (o), 2345 (N,P).

PYRUS ARBUTIFOLIA (L.) L. f. Thickets and wet depressions; of frequent occurrence. NON: 2885 (N,P); UNC: 3046 (N,P); NAS: 1774 (N,P), 3495 (P).

P. ARBUTIFOLIA (L.) L. f., var. ATROPURPUREA (Britton) Robinson. Same situations as the last but less common. NON: 3175 (N,P); UNC: 3124 (N,P); NAS: *Northrop*, Aug. 1901 (Y).

AMELANCHIER OBLONGIFOLIA (T. & G.) Roem. Dense thickets and sheltered hollows; abundant. NON: 2630 (P), 2883 (N,P), 3205 (P), 3202 (P,C), 3308 (P,M,C); PEN: 1421 (P,W).

CRATAEGUS PRUINOSA (Wendl.) C. Koch. Single tree on dry hillside near Tarpaulin Cove. NAU: 1801 (N,P).

CRATAEGUS *spp.* This genus is to be met with scattered throughout the dry, sandy beech woods, mostly on Naushon. Several collections have been made, but it has not been found possible to match this material with existing specimens or to reconcile it with available descriptions. Each individual plant appears to possess its own characteristics which differ from those of its neighbor, and, rather than give to these specimens names which assume a definiteness that they do not own, the problem is here left in abeyance.

FRAGARIA VIRGINIANA Duchesne. Dry open slopes and hollows. NON: 3287 (N); NAS: *Northrop* (o); PEN: 1422 (W).

F. VIRGINIANA Duchesne, var. TERRAE-NOVAE (Rydb.) Fernald & Wiegand. RHODORA, xiii. 106 (1911). Seen only in a sandy meadow near Cuttyhunk Pond. CUT: 3581 (N,P).

F. vesca L. Reported by Jordan from Penikese: no specimen.

POTENTILLA NORVEGICA L., var. HIRSUTA (Michx.) Lehm. *P. monspeliensis* L. See Bibliot. Bot. 16, Heft lxxi. 404 (1908). Dry open ground. PEN: 1424 (N,P,W,M).

P. argentea L. Dry sandy and gravelly soil. NAS: *Northrop* (o); PEN: 1423 (N,P,W,M).

P. recta L. Sandy clearing in woods near West Gutter. NAU: 3923 (N,P).

P. PACIFICA Howell. *P. Anserina* of Manual, in part. See Fernald, RHODORA, xi. 1 (1909). Shingle beach along south shore of Nonamesset. NON: 2874 (N,P,M); NAS: *Northrop*, as "*P. Anserina*" (o).

P. PUMILA Poir. Dry knolls and exposed sandy and grassy hillsides. NON: 2677 (N,P), 3288 (P,M,C); PEN: 1425 (N,P,W).

P. CANADENSIS L., var. SIMPLEX (Michx.) T. & G. The Elizabeth Islands material seen all has narrow, oblanceolate leaves and short, more or less appressed, pubescence. Dry slopes and sandy clearings. NON: 3355 (N,P,M); CUT: 2536 (N).

GEUM CANADENSE Jacq. Apparently rare; boggy woods at east end of Nashawena. NAS: *Northrop* (o), 3544 (P).

RUBUS OCCIDENTALIS L. Edge of woods at west end of Nonamesset. NON: 2676 (N).

R. PERGRATUS Blanchard. Thickets and margins of boggy hollows. NAS: 3487 (P); PEN: 1428 (N,P,W).

R. laciniatus Willd. Well established on peninsula of Penikese. PEN: 1429 (N,P,W).

R. ANDREWSIANUS Blanchard. This is the commonest Blackberry on the Islands, occurring in wet overgrown hollows and in thickets on open slopes. NON: 2577 (P). 2626 (N,P); UNC: 3034 (P); NAU: *Pennell* 3135 (W), 2496 (P), 2497 (P).

R. HISPIDUS L. Abundant; apparently as much at home on the dry exposed hillsides as in the boggy depressions. NAS: *Northrop* (o), 3539 (N); CUT: 2312 (P), 2321 (N,P,M).

R. FLAGELLARIS Willd. *R. procumbens* of many authors. *R. villosus* of the manual. See Bailey, Gentes Herb. i. 234 (1925). Trailing over dry open sandy and gravelly ground. NAS: *Northrop* (o); PEN: 1430 (N,P,W).

Rosa rugosa Thunb. Established and thriving, usually along beaches, on several of the islands. NAU: *Taylor* 3077 (P); CUT: 3439 (N); PEN: 1427 (P,W).

R. rubiginosa L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

R. PALUSTRIS Marsh. *R. carolina* of Manual and most American authors. See Fernald, RHODORA, xx. 91. (1918). Wet margins of ponds. NAS: *Northrop*, July, 1901 (Y), 2354 (N,W); PEN: 1426 (W).

R. CAROLINA L. *R. humilis* Marsh See Fernald, l. c. Wet hollows and pond margins. NON: 2631 (N,P); NAS: *Northrop* (o), 3477 (P); CUT: 3461 (N).

R. NANELLA Rydb. N. Am. Fl. xxii (pt. 6), 497 (1918). Material collected from sandy thicket on Uncatena has dwarf stature and very narrow leaflets and corresponds in all essentials to Rydberg's description of this species. UNC: 3112 (N).

R. VIRGINIANA Mill. Moist hollows and swampy borders of ponds. NON: *Pennell* 2843 (P), 3173 (N,P), 3346 (P,M); PAS: 3746 (N,P).

PRUNUS SEROTINA Ehrh. Sheltered hollows, thickets and sandy woods. NON: 2671 (N,P); UNC: 3108 (P); NAU: 2501 (N,P); NAS: *Northrop* (o), 3519 (P); PEN: 1431 (W).

P. MARITIMA Wang. Apparently not very common; forms a dense thicket at east end of Nonamesset. NON: 3206 (N), 3303 (P,M); NAS: *Northrop* (o).

LEGUMINOSAE

Gleditsia triacanthos L. Sandy woods near dwellings at east end of Naushon; originally introduced. NAU: 3925 (P).

Genista tinctoria L. Well established and spreading in fields at east end of Naushon and on Uncatena. UNC: 2976 (N); NAU: 796 (N, P,W).

Cytisus scoparius (L.) Link. Abundant and spreading on parts of Naushon (see p. 155); local elsewhere. NAU: *Miss Weir*, June 22, 1890 (N), *Moore*, 1903 (N); PAS: *Hollick*, Aug. 1898 (Y); NAS: *Northrop* (o).

Ulex europaeus L. A single large clump along road near Mary's Lake. NAU: 797 (W).

Trifolium arvense L. Dry open ground and sandy areas. NON: 2669 (P); UNC: 3012 (N); NAS: *Northrop* (o); CUT: 2257 (N); PEN: 1434 (P,W).

T. pratense L. Grassland; occasional. NAS: *Northrop* (o); PEN: 1435 (P,W).

T. repens L. Open fields and grassy levels. NAS: *Northrop* (o); CUT: 2261 (N,P); PEN: 3402 (N,P).

T. hybridum L. Open grassland; occasional. NAS: *Northrop* (o); PEN: 1436 (P,W).

T. agrarium L. Disturbed sandy soil near areas under cultivation. PEN: 1433 (N,P,W).

Coronilla varia L. Abundant on grassy hillside toward west end of Pasque. PAS: 795 (P,W).

Robinia Pseudo-Acacia L. At several localities along the north shore of Naushon, where doubtless planted but now spreading. NAU: 3874 (N,P); NAS: *Northrop* (o).

DESMODIUM RIGIDUM (Ell.) DC. Sandy woods and hills; not common. UNC: 2977 (N,P); NAU: 2600 (N,P).

D. OBTUSUM (Muhl.) DC. Sandy woods and clearings. NAU: 3910 (P,M,C), 3928 (N,P).

LESPEDEZA PROCUMBENS Michx. Not abundant; seen only in sandy woods on "Captain's Island." NAU: 3909 (N,P,M).

L. VIOLACEA (L.) Pers. Reported from Nashawena by Mrs. Northrop; no specimens seen.

L. HIRTA (L.) Hornem. On Mrs. Northrop's Nashawena list; no specimen seen.

L. CAPITATA Michx. Apparently not abundant; open, sandy bank on Uncatena, west end. UNC: 3129 (N).

Vicia tetrasperma (L.) Moench. Disturbed sandy area near landing. PEN: 1438 (W).

V. Cracca L. Dry, open ground. CUT: *Taylor* 3076 (P); PEN: 1437 (N,P,W,M,C).

V. villosa Roth. Dry sandy strip near Cuttyhunk Pond. CUT: 3579 (N,P).

LATHYRUS MARITIMUS (L.) Bigel. Sea beaches; commoner on outer islands. NAS: *Northrop* (o); CUT: 2263 (N,P); PEN: 1432 (N,P,W).

L. PALUSTRIS L. Known only from single collection on Nashawena. This material approaches var. *pilosus*. NAS: *Northrop*, "July–Aug." 1901 (Y).

APIOS TUBEROSA Moench. Occasional in wet hollows and around ponds. UNC: 3089 (N); NAS: *Northrop* (o); CUT: 2328 (N,P).

AMPHICARPA MONOICA (L.) Ell. Sandy woods near Hadley Harbor. NAU: 3917 (N,P); NAS: *Northrop* (o).

LINACEAE

LINUM STRIATUM Walt. Dry hillsides and peaty pond margins. CUT: 2330 (P), 2538 (N,P).

L. VIRGINIANUM L. Dry sandy woods. NAU: *Williams & Collins*, July 10, 1911 (N), 2381 (N,P).

OXALIDACEAE

OXALIS STRICTA L. Open sandy hillsides and sandy clearings. UNC: 3096 (P); NAU: *Pennell* 3142 (W), 2498 (P), 3682 (P); NAS: *Northrop* (o); PEN: 1439 (N,P,W).

GERANIACEAE

GERANIUM MACULATUM L. Seen only on an exposed gravel bank at upper margin of beach along north shore of Nonamesset. NON: 3364 (N,P).

G. CAROLINIANUM L. Burnt-over ground near hospital building on Penikese. PEN: 1440 (W).

SIMARUBACEAE

Ailanthus glandulosa Desf. Naturalized and spreading at several localities on Naushon and Nashawena. NAS: *Northrop* (o), 3481 (P).

POLYGALACEAE

POLYGALA POLYGANA Walt. Open sandy and grassy hillsides. NAU: 2477 (N); NAS: *Northrop*, "July–Aug." 1901 (Y).

P. SANGUINEA L. Low boggy ground. Not common. NAS: *Northrop* (o), 3563 (N).

P. CRUCIATA L. Peaty and boggy pond borders; apparently not widespread. CUT: *Sanford*, Aug. 15, 1917 (N), 2514 (N,P).

EUPHORBIACEAE

ACALYPHA VIRGINICA L. Known only from a sheet of Dr. Pennell's collecting on Naushon. NAU: *Pennell* 3140 (W,P).

A. DIGYNEIA Raf. See Weatherby, RHODORA, xxix. 193 (1927). Rare. Boggy depression in open hills near east end of Uncatena. UNC: 3131 (N).

A. GRACILENS Gray. Dry hillsides and moist depressions; local. UNC: 2974 (P), 3087 (N).

EUPHORBIA POLYGONIFOLIA L. Sea beaches and low sandy stretches. NON: 2870 (N); UNC: 3008 (N); PAS: 3755 (P,M); NAS: *Northrop*, "July–Aug." 1901 (Y); PEN: *Jordan* (o).

E. MACULATA L. Sandy beaches and dry exposed slopes. NON: 2869 (N); NAU: 2499 (P); PEN: *Jordan* (o).

CALLITRICHACEAE

CALLITRICHE PALUSTRIS L. Apparently rare and local. NAS: *Northrop* (o), 3521 (P).

C. HETEROPHYLLA Pursh. Small ponds in hills; more frequent than last. NON: 2235 (N); PEN: 456 (W), 1095 (P,W), 1758 (N,P).

(*To be continued*)

A CAREX NEW TO NEW ENGLAND.—On a hasty trip to Mt. Katahdin, on 2 September, 1929, I gathered a few specimens of *Carex* around the shores of Chimney Pond. These were later submitted to Professor Fernald, who informs me that one of them (no. 21,180, now deposited in the Herbarium of the New England Botanical Club) is *C. anguillata* Drejer, a species described from Iceland and also known from northern Labrador, northern Ungava, and Wager Inlet on the northern side of Hudson Bay.—ARTHUR STANLEY PEASE, Amherst College.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 32. December, 1930. No. 384.

NOTES ON KATAHDIN PLANTS

S. Judson Ewer

During the latter part of July and the fore part of August of the summer of 1929 it was my privilege to spend approximately three weeks at Mt. Katahdin, Maine. Collections were made of the various plants met with, both in the better known regions of the Mountain and also in such little traversed portions as the Northwest Basin and the cirque containing Klondike Pond. The following is a list of those plants collected concerning which I find no reference in published lists and notes dealing with the flora of the upper slopes of Katahdin. Thanks are due to Professor M. L. Fernald of the Gray Herbarium for his kindness in checking identifications. Specimens are deposited in the herbarium of the New England Botanical Club and in the writer's private collection.

Woodsia ilvensis (L.) R. Br. One small clump in a crevice of the cliffs of the north wall of the North Basin at an altitude of about 3600 feet. The fronds were in fruiting condition at the time of collection, July 26.

Dicksonia punctilobula Michx. Abundant along the trail just below Basin Pond Camp, 2400 feet.

Equisetum sylvaticum L. Sterile stalks abundant in the grass at the head of Klondike Pond, 3440 feet.

Pinus Strobus L. One small specimen, 10 inches high, on the floor of the North Basin at approximately 3300 feet. This little tree was growing in the shelter of a rock in company with such plants as *Vaccinium Vitis-Idaea*, var. *minus*, *Kalmia angustifolia*, *Vaccinium uliginosum* and scrub birch. It appeared in flourishing condition and had much new growth.

Sparganium angustifolium Michx. Occurring very sparingly in the shallow water near the outlet of Lake Cowles, Northwest Basin, 2860 feet. Also found in the shallow water along the north shore of Lower Basin Pond, 2460 feet.

Calamagrostis canadensis (Michx.) Beauv., var. acuminata Vasey. According to my collections this is the variety of *C. canadensis* occurring commonly on the Mountain along the ponds, slides and walls. It is very abundant in the open at the head of Klondike Pond. *C. canadensis* appears in lists of Katahdin plants,[1] [2] and possibly a reëxamination of this older material might reveal the specimens to be var. *acuminata*.

Glyceria striata (Lam.) Hitchc., var. stricta (Scribn.) Fernald. This is the northern variety of *Glyceria striata* (*G. nervata* (Willd.) Trin.) and was found on the north wall of the North Basin at an elevation of approximately 3700 feet. *G. nervata* is mentioned in Fernald's list[2] as occurring at Chimney Pond.

Carex intumescens Rudge, var. Fernaldii Bailey. Found along the trail from Chimney to Basin Ponds at about 2500 feet. *C. intumescens* is listed by Harvey[3] from the North and Northwest Basins, and from Dry Pond.

Carex paupercula Michx., var. irrigua (Wahlenb.) Fernald. Occurring in the sphagnum along the southern shore of Lower Basin Pond, 2460 feet. Also in a small, boggy area at the head of Klondike Pond, 3440 feet.

Carex leptonervia Fernald. In the open, grassy area at the head of Klondike Pond, 3440 feet. Also along the southern shore of Lower Basin Pond, 2460 feet.

Scirpus atrovirens Muhl., var. georgianus (Harper) Fernald. In the opening about Chimney Pond Camp, 2914 feet.

Juncus tenuis Willd., var. Williamsii Fernald. In the opening about Chimney Pond Camp, 2914 feet.

Juncus effusus L., var. Pylaei (Laharpe) Fern. & Wieg. In the opening about Chimney Pond Camp, 2914 feet.

Salix arctophila Cockerell. In moist sphagnous banks of the wall above Klondike Pond at approximately 3700 feet. This is a characteristic shrub of Greenland, Labrador and western Newfoundland, and Professor Fernald informs me that it has not been previously collected south of the Shickshock Mts. of Gaspé. It is therefore new to New England.

Cerastium vulgatum L. Introduced near Chimney Pond Camp, 2914 feet.

Nymphaea rubrodisca (Morong) Greene. Found sparingly along the eastern shore of Lake Cowles, Northwest Basin, and also in the shallow water near the outlet, 2860 feet. Although at a comparative high altitude Lake Cowles has surprisingly warm water and supports the most extensive aquatic vegetation of any of the ponds of Mt. Katahdin. Davis Pond, also in the Northwest Basin, and at the

[1] Lamson-Scribner, F. Mt. Kataadn and Its Flora. Bot. Gaz. 17: 46–54. 1892.
[2] Fernald, M. L. Vascular Plants of Mt. Katahdin. Rhodora 3: 166–177. 1901.
[3] Harvey, L. H. An Ecological Excursion to Mt. Ktaadn. Rhodora 5: 41–52. 1903.

same elevation as Lake Cowles, is icy cold and seems practically devoid of aquatic plant life.

POTENTILLA MONSPELIENSIS L. Found along the shore of Lower Basin Pond, 2460 feet.

EPILOBIUM ADENOCAULON Haussk. One specimen was found in the region intermediate between Lower and Upper Basin Ponds, 2460 feet.

OENOTHERA PUMILA L. Found along the shore of Lower Basin Pond, 2460 feet.

CIRCAEA ALPINA L. Growing rather abundantly in the shade of balsam at the edge of the grassy area at the head of Klondike Pond, 3440 feet. In bud upon July 22.

ANDROMEDA GLAUCOPHYLLA Link. Abundant in sphagnum on the wall above Klondike Pond, 3600 feet to 3900 feet. There are rather extensive boggy areas upon this gently sloping wall, characterized by such bog plants as *Vaccinium Oxycoccus, Drosera rotundifolia, Kalmia polifolia*, etc.

ASTER PUNICEUS L., var. OLIGOCEPHALUS Fernald. Found commonly in the grassy area at the head of Klondike Pond, 3440 feet. According to Professor Fernald, this plant is common in southern Labrador, Newfoundland, and the Gaspé Mts., and it also occurs in the White Mts. of New Hampshire. It has not been previously reported from Katahdin.

ASTER PUNICEUS L., var. PERLONGUS Fernald. Found along the trail between Chimney and Basin Ponds, not far from the latter. This, Professor Fernald informs me, is the first collection other than the original from Table Top Mt., Gaspé. It is therefore new to New England.

LEYDEN, MASSACHUSETTS.

AIRA SPICATA, LINN, AND THE APPLICATION OF THE INTERNATIONAL RULES

OLIVER ATKINS FARWELL

IN RHODORA for October, 1929, Mr. K. K. Mackenzie, using the Vienna Code, Article 51 (2) and Article 56, argues that *Aira spicata* L., Sp. Pl. p. 64, is invalidated by *Aira spicata* L., l. c., p. 63, hence *Trisetum spicatum* (L.) Richter, based on the former, is also invalid.

Mr. A. S. Hitchcock, commenting in RHODORA for December, 1929, on the above paper by Mackenzie, argues under Article 50 of the International Rules, that the second *Aira spicata* L. was validated when Linn corrected, in an erratum, the first *Aira spicata* and changed it to *Aira Indica*, claiming that this makes the first *A. spicata* universally regarded as nonvalid.

The first *A. spicata* has been universally regarded as a synonym of *A. Indica*, and rightly so, but it cannot be regarded, under the International Rules, as universally nonvalid—quite the contrary. Being a synonym is not necessarily being nonvalid, and there is no article in the International Rules that would make one of these names nonvalid; the application of these rules is intended to apply to species *when found in their proper genera.* It was perfectly right for Linnaeus to correct one of these names, as long as both remained in the genus *Aira.* He went further and discarded both for new names. But when modern botanists remove them to their proper genera, they must revert to the use of the original specific names and the secondary or substitute names become synonyms.

In my estimation none of the rules for the rejection of a name under Section 7 can be applied in the present case, as under the International Rules there is no name to be rejected, each name being valid for its respective species (Article 48); also, Article 27 specifically says that the same specific name may be given in several genera. As *Aira spicata* on page 63 is not even congeneric with *A. spicata* on page 64, the specific name "spicata" *must be retained* (Article 48) for each species when removed to its proper genus, unless there is already in the genus to which it is removed a valid species under the same name (Article 53). If *Aira spicata* No. 1, and *Aira spicata* No. 2, were conspecific or congeneric, one of the names would have to go (Article 27) but since neither is the case, neither has to go, and *Trisetum spicatum* (L.) Richter, is correct. Also, the correction of the first *A. spicata* to *A. Indica, at a later date*, only makes the latter a mere synonym (Article 50, 51) (1), and therefore a name not to be admitted.

In so far as I am aware, there is no valid species of the specific name *spicatum* under *Panicum*, so that *Aira spicata* Linn, Sp. Pl., p. 63 (*A. Indica* Linn) when removed to its proper genus should become (Article 48) *Panicum* **spicatum** (Linn) Farwell, n. comb.

A very similar case is that of *Hedysarum rotundifolium* Vahl (1791) and *H. rotundifolium* Mx. (1803). Here we have two distinct species published under the same generic name by two different authors at different dates but under the same specific name. As neither of these species belongs in *Hedysarum*, are not conspecific nor even congeneric, they must be removed each to its proper genus, and (Article 48) each must retain its first specific name (*rotundifolium*), unless it falls foul of one or another of the impediments enumerated

in the International Rules. Michaux's species becomes *Desmodium rotundifolium* (Mx.) DC. Vahl's species is not so fortunate, for when transferred to *Indigofera*, it meets one of the impediments of the Rules. There is a valid species of the same name, *Indigofera rotundifolia* Lour. (1790), and hence (Article 53) *Hedysarum rotundifolium* Vahl must change its specific name when referred to its proper genus (*Indigofera*), probably to *I. prostrata* Roxb. (*I. echinata* Willd.). Both the species of Vahl and of Michaux, having been removed from *Hedysarum*, the way is left open for the use of the specific name *rotundifolium* for some genuine species of the genus. So we have the legitimate *Hedysarum rotundifolium* Boiss. et Noé (Article 50).

Department of Botany, Parke, Davis & Co.,
Detroit, Michigan.

THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

John M. Fogg, Jr.

(*Continued from page 258*)

ANACARDIACEAE

Rhus typhina L. Occasional in sheltered hollows on hillsides. NAS: *Northrop* (o), 3479 (N); PEN: 1441 (P,W), 3409 (N,P).

R. glabra (L.) Gray. No material seen; reported by Mrs. Northrop from Nashawena.

R. glabra (L.) Gray, var. borealis Britton. See Britton's Man. Fl. No. St. Can. 601 (1901). Forming a small grove along the Northwest Gutter at the west end of Uncatena. UNC: 2453 (P,M).

R. copallina L. Open slopes and moist depressions. UNC: 3039 (N); PAS: 3793 (N,P); NAS: *Northrop*, Aug. 13, 1901 (Y).

R. Vernix L. Swampy woods and thickets. NAU: 2485 (N,P); PAS: 3794 (N); NAS: Northrop (o).

R. Toxicodendron L. Thickets, copses and overgrown hollows. Extremely variable as to habit, leaf-shape and fruit. NON: 3345 (N,P,M); UNC: 3040 (N,P); PAS: 1785 (N,P); NAS: *Northrop* (o), 2352 (N); CUT: 2314 (N); PEN: *Jordan* (o).

AQUIFOLIACEAE

Ilex opaca Ait. Occasional in sandy wooded areas. NAU: 2488 (P,M,C); NAS: *Northrop* (o), 3535 (N).

I. opaca Ait., forma subintegra Weatherby. Rhodora, xxiii. 118 (1921). Sandy woods with the last; rare. NAU: 2484 (N,P,W,M,C).

I. VERTICILLATA (L.) Gray. Moist overgrown depressions and wet borders of ponds. NON: 3174 (N,P,M); NAS: 3490 (P).

I. VERTICILLATA (L.) Gray, var. FASTIGIATA (Bickn.) Fernald. RHODORA, xxiii. 274 (1921). In similar situations as last; occasional. NON: 2884 (N, P, M); NAS; *Northrop*, "July–Aug." 1901 (Y), 3494 (N).

I. LAEVIGATA (Pursh) Gray. Reported by Mrs. Northrop for Nashawena; no specimen seen.

I. GLABRA (L.) Gray. The Inkberry is evidently very rare on the Elizabeth Islands. Although sought for repeatedly, it is known only from a single specimen collected on Nashawena by Mrs. Northrop. NAS: *Northrop*, Aug. 1901 (Y).

ACERACEAE

ACER RUBRUM L. Sandy and boggy woods and thickets; var. *tridens* was nowhere seen. NON: 2655 (N,P); NAS: *Northrop* (o), 3534 (N).

A. platanoides L. Planted in small grove near hospital building on Penikese. PEN: 1443 (W).

A. Pseudo-Platanus L. A few trees with the preceding. PEN: 3410 (P,M).

SAPINDACEAE

Aesculus Hippocastanum L. Included in Mrs. Northrop's list with the comment, "Single good sized tree in midst of native trees about Choptauk Lake. Introduced." No specimen seen.

BALSAMINACEAE

IMPATIENS BIFLORA Walt. Wet borders of ponds. NON: 2887 (N); NAU: 2735 (N,P); NAS: *Northrop* (o).

VITACEAE

PARTHENOCISSUS QUINQUEFOLIA (L.) Planch. *Psedera quinquefolia* Greene. Occasional in thickets. NON: 2294 (N,P); NAS: *Northrop* (o); PEN: 856 (W).

P. tricuspidata (Sieb. & Zucc.) Planch. Trailing over stone wall near hospital building on Penikese. PEN: 3411 (N,P).

VITIS LABRUSCA L. Thickets and moist hollows. UNC: 3028 (N); NAS: *Northrop*, July, 1901 (Y), 3493 (P).

V. AESTIVALIS Michx. Trailing over low trees, edge of sandy woods. NAU: 2490 (P).

MALVACEAE

Malva rotundifolia L. Dry sandy soil, waste places. NAU: *Pennell* 3115 (W); NAS: *Northrop* (o); PEN: 1442 (P,W).

Althaea officinalis L. Mrs. Northrop, in listing this species for Nashawena, says, "2 or 3 plants on different parts of shore." No specimen seen.

Hibiscus Moscheutos L. Borders of salt marshes. NON: 2673 (P); UNC: 2985 (N,P); NAU: 2378 (N).

HYPERICACEAE

Hypericum perforatum L. Abundant everywhere on dry hillsides. NON: 2679 (P); UNC: 2968 (N); NAS: *Northrop* (o), 3552 (P); CUT: 2332 (N); PEN: 1445 (N,P,W,M,C).

H. boreale (Britton) Bickn. Pond borders and wet hollows; abundant. NON: 2642 (P,W), 2701 (N,P); UNC: 2983 (N); NAU: 2726 (N,P); PAS: 3738 (P); NAS: 3523 (P).

H. mutilum L. Same habitats as last; less frequent. NON: 2569 (N); NAU: *Pennell* 3125 (W), 2389 (P); NAS: *Northrop* (o); PEN: *Jordan* (o).

H. canadense L. Peaty pond margins and boggy hollows. NON: 2645 (N); UNC: 3023 (N,P), 3085 (N,P); NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N).

H. gentianoides (L.) BSP. Dry sandy hillsides and clearings. NON: 2694 (P); UNC: 3086 (N); NAS: *Northrop* (o).

H. virginicum L. Sandy and peaty pond borders, often partly immersed. NON: 2640 (P), 3171 (N,P,C); UNC: 3022 (N); NAU: 2927 (N,P); NAS: *Northrop* (o), 2351 (P,M); CUT: *Sanford*, Aug. 15, 1917 (N).

ELATINACEAE

Elatine minima (Nutt.) F. & M. See Fernald, Rhodora, xix. 10 (1917). Sandy bottoms and borders of ponds. NON: 2706 (N,P); NAU: *Pennell* 3202 (W), 2727 (P), 2943 (N); PAS: 1061 (P), 1064 (P); NAS: *Northrop* (o); CUT: 2533 (N).

CISTACEAE

Helianthemum canadense (L.) Michx. Open grassland and dry sandy clearings; abundant. NON: 2625 (N,P), 2578 (P,M), 2903 (N); NAU: 2474 (P,M), 2598 (N,P); NAS: *Northrop* (o), 3558 (P).

H. propinquum Bickn. See Bull. Torrey Bot. Club, xl. 615 (1913). Seen only on sandy bank bordering West End Pond. NAU: 2915 (N,P).

H. bicknellii Fernald. *H. majus* of Manual. See Rhodora, xxi. 36 (1919). Dry, open, grassy slopes. NAU: 2493 (P), 2945 (N); PAS: *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop*, Aug. 1901 (Y).

H. dumosum (Bickn.) Fernald. See Bull. Torrey Bot. Club, xl. 613 (1913), and Rhodora, xix. 60 (1917). Grassland and sandy clearings. NAU: 2494 (P,W), 2944 (N); PAS: *Svenson*, Sept. 8, 1926 (N); NAS: *Northrop*, Aug. 1901 (Y), 3557 (P,M).

Hudsonia tomentosa Nutt. Open sandy areas. NAU: *Williams*, July 10, 1911 (N); PAS: 800 (N,P,M); NAS: *Northrop*, "July–Aug." 1901 (Y), *Williams*, July 10, 1911 (N), *Pennell* 2916 (W), 2365 (P,M).

Lechea villosa Ell. Apparently not common; sandy woods on Naushon. NAU: 2462 (P).

L. MARITIMA Leggett. Abundant on open downs and sandy stretches. NON: 2584 (N), 2624 (P); NAU: 2473 (P), 2481 (P), 2597 (N); PAS: 3770 (P).

L. LEGGETTII Britton & Hollick. Reported by Mrs. Northrop from Nashawena; no specimen seen.

VIOLACEAE

VIOLA PAPILIONACEA Pursh. Not common; seen only in sandy beech woods on Naushon. NAU: 3314 (P), 3326 (N,P).

V. FIMBRIATULA Sm. Abundant on open downs and dry, grassy slopes. NON: 2581 (N), 3289 (P); NAU: *Pennell* 3129 (W), 3126 (P); CUT: *Sanford*, Aug. 15, 1917 (N), 2457 (P,M); PEN: 1444 (N,P,W).

[V. SAGITTATA Ait. Reported by Jordan for Penikese and by Mrs. Northrop for Nashawena but probably refers to the preceding.]

V. LANCEOLATA L. Open bogs and peaty borders of ponds. NON: 2568 (P,M), 2894 (N), 3307 (P); UNC: 3088 (N); NAU: *Pennell* 3122 (W), 2511 (N); NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N).

V. PALLENS (Banks) Brainerd. Peaty and boggy hollow at west end of Nashawena. NAS: 3499 (N,P).

[V. BLANDA Willd. Appears on Mrs. Northrop's Nashawena list. In absence of specimens it seems most likely that this refers to the preceding.]

LYTHRACEAE

DECODON VERTICILLATUS (L.) Ell. Abundant in swamps, borders of ponds and low wet thickets. NON: 2563 (N,P), 3170 (N,P); NAU: 2387 (N); PAS: 3795 (P); NAS: *Northrop* (o), 2338 (N,P,M,C); CUT: *Sanford*, Aug. 15, 1917 (N).

MELASTOMACEAE

RHEXIA VIRGINICA L. Wet, peaty depressions and borders of small ponds. NON: 2639 (N,P,M); NAS: *Northrop*, "July–Aug." 1901 (Y), *Northrop*, Sept. 1901 (Y), 3548 (P); CUT: 2522 (P).

ONAGRACEAE

LUDVIGIA PALUSTRIS (L.) Ell. Floating or growing on moist mud; small pond holes. NON: 2240 (C), 2571 (P,M), 3164 (N,P); NAU: 2468 (N,P); PAS: 3784 (P); NAS: *Northrop* (o), 3526 (N,P); CUT: 3447 (P); PEN: 457 (P,W).

EPILOBIUM DENSUM Raf. Reported by Mrs. Northrop from Nashawena as *E. lineare;* no specimen seen.

E. PALUSTRE L., var. MONTICOLA Haussk. Collected in an open sphagnum bog at the west end of Cuttyhunk on July 28, 1927. CUT: 2307 (N).

E. COLORATUM Muhl. Seen only on the shingle at French Watering Place; perhaps more general. NAU: 2718 (N).

E. GLANDULOSUM Lehm., var. ADENOCAULON (Haussk.) Fernald. *E. adenocaulon* Haussk. See RHODORA, XX. 34 (1918). Reported from Nashawena by Mrs. Northrop; no specimen seen.

OENOTHERA MURICATA L. Dry sandy soil, east end of Pasque; probably more common. PAS: 3761 (P).

O. BIENNIS L. Dry sterile ground, occasionally in grassland. NAS: *Northrop* (o); PEN: 1446 (N,P,W).

O. grandiflora Ait. On Penikese, where probably introduced. PEN: 1447 (W).

HALORAGIDACEAE

MYRIOPHYLLUM SCABRATUM Michx. Rather frequent; small ponds and wet pond holes. NON: 2241 (G,N,P), 3363 (P); UNC: 2996 (N,P,M,C), 3647 (P); NAU: 801 (N); NAS: *C. E. Faxon*, Sept. 1875 (G), *Northrop* (o); PEN: 453 (N,P,W), 3398 (P).

M. HUMILE (Raf.) Morong. Abundant and variable; forma *capillaceum* and forma *natans* have both been met with but appear to be nothing more than mere ecological variations. NON: 2705 (N,P,M,C); NAU: 2503 (N,P,M); PAS: 845 (N,P); NAS: *Northrop* (o), 3520 (N,P); CUT: 3448 (P).

M. TENELLUM Bigel. Muddy borders and bottoms of several small ponds. NAU: 2401 (N), 2753 (N,P); PAS: 1068 (W); NAS: *Northrop* (o); CUT: *Hervey*, no date (N).

PROSERPINACA PALUSTRIS L. Ponds and pond borders, often submerged. NON: 2570 (P), 2643 (N,P), 3382 (P,M); UNC: 3026 (N); PAS: 554 (P,W); NAS: *Northrop*, July, 1901 (Y); CUT: 803 (W), *Sanford*, Aug. 15, 1917 (N).

UMBELLIFERAE

SANICULA CANADENSIS L. Dry sandy woods; not common. NAU: 2459 (P,M), 3927 (N,P,C).

HYDROCOTYLE UMBELLATA L. Shallow water of ponds and muddy or grassy pond margins. UNC: 3001 (N); NAU: *Williams et al.*, July 10, 1911 (N), 1805 (N), 2502 (N,P), 2729 (M), 2947 (N,P,C); NAS: *Northrop*, "July–Aug." 1901 (Y), *Pennell* 2923 (W); CUT: *Sanford*, Aug. 15, 1917 (N).

H. CANBYI Coult. & Rose. NAU: 1069 (G), 2948 (N,P).

In the Gray Herbarium there is a specimen of *H. Canbyi* labelled *H. umbellata*, var. *ambigua* which was collected at "Woods Holl, Sept. 10, 1876, on shores of Nobska Pond." This sheet is further labelled "Herb. W. G. Farlow," and, though no collector's name appears, may have been collected by Farlow himself. It constituted the only known record for this plant north of southern New Jersey until 1925 when, on July 14, Dr. H. K. Svenson and the writer found it growing around the shores of French Watering Place on Naushon.

On Aug. 31, 1927, the writer again visited this locality and found the plant, this time along another portion of the shore of the same pond. *H. Canbyi* is thus definitely established as a member of the flora of New England.

H. VERTICILLATA Thunb. NON: 2895 (G,N,P); UNC: 2981 (G, N,P,W), 3000 (P).

The reported occurrence of this species in Massachusetts has apparently been based upon a sheet collected by Thomas Morong at Woods Hole on Aug. 10, 1877. This sheet, which is in the Gray Herbarium, bears the determination "*H. interrupta* Muhl." and is perfectly typical *H. verticillata* as understood today. Also, there is a sheet of this species in the herbarium of the Boston Society of Natural History collected at New Bedford and further labelled merely "Oakes Coll." Southwest of Massachusetts the plant has been known only from Block Island before "jumping" to southern New Jersey (Cape May County).

On August 30, 1927, while exploring the west end of Nonamesset, the writer came upon a small pond in the open hills which was filled with a species of *Hydrocotyle*. This, upon examination, proved to be *H. verticillata*. Three days later, September 2, this same species was found growing in profusion in two small grassy ponds along the north shore of Uncatena toward the east end. Thus, a second member of this genus is restored to our list for this region after a lapse of half a century.

PTILIMNIUM CAPILLACEUM (Michx.) Raf. Borders of brackish ponds and salt marshes. NON: 2595 (N), 2664 (P); UNC: 3019 (N,P); NAU: 2370 (P,M,C), 2715 (N,P); NAS: *Northrop* (o), 3501 (P).

CICUTA MACULATA L. On Mrs. Northrop's list for Nashawena; no specimen seen.

SIUM SUAVE Walt. *S. cicutaefolium* Schrank. See Blake, RHODORA, xvii. 131 (1915). Swampy hollows in woods and borders of ponds. UNC: 2988 (P); NAU: 2386 (N,P); NAS: *Northrop* (o), 2350 (N,P); CUT: 3443 (P).

LIGUSTICUM SCOTHICUM L. Sandy and gravelly beaches. NON: 3210 (N); UNC: 2979 (N,P); PAS: 557 (P,W); PEN: 1449 (P,W).

COELOPLEURUM LUCIDUM (L.) Fernald. *C. actaeifolium* (Michx.) C. & R. See Fernald, RHODORA, xxi. 144 (1919). Sand and cobble beaches; not very common. CUT: 3435 (N,P); PEN: *Jordan* (o).

Pastinaca sativa L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

HERACLEUM LANATUM Michx. Seen growing only on gravelly bank along East Gutter. NON: 3310 (N); NAS: *Northrop* (o).

Daucus Carota L. Dry grassland; apparently not common. NAS: *Northrop* (o); CUT: 2326 (N,P); PEN: 1448 (P,W).

CORNACEAE

Cornus florida L. Fairly abundant in boggy woods in hollows along south shore of Nonamesset; perhaps elsewhere. Seen in full "flower" on May 28, 1928. NON: 3302 (N,P,M,C); NAS: *Northrop* (o).

Nyssa sylvatica Marsh. A common tree both in the wet wooded hollows and in the moist portions of the beech-oak forests. NON: 2636 (P), 2667 (W,M), 2886 (N,P); NAU: *Simons*, July 23, 1901 (W), 2932 (N); NAS: *Northrop* (o), *Williams*, July 10, 1911 (N), 3517 (P).

ERICACEAE

Clethra alnifolia L. Thickets and pond borders; abundant. NON: 2293 (P,C), 2627 (N,P), 2882 (N,M); UNC: 3649 (N,P); NAS: *Northrop* (o), 1771 (P); CUT: 2309 (P).

Chimaphila maculata (L.) Pursh. Reported by Mrs. Northrop from Nashawena; no specimen seen.

Pyrola rotundifolia L., var. americana (Sweet) Fernald. *P. americana* Sweet. See Rhodora, xxii. 122 (1920). Mrs. Northrop, who reports this from Nashawena, says, "Few plants in one station." No specimen seen.

Monotropa uniflora L. Dry sandy beech and oak woods. NAU: *Williams*, July 10, 1911 (N), 806 (P,W); NAS: *Northrop* (o), 3537 (P).

M. hypopithys L. Seen only in sandy woods at east end of Nashawena; perhaps more common. NAS: 3538 (N).

M. hypopithys L., var. rubra (Torr.) Farwell. See Amer. Midl. Nat., x. 39 (1926). The crimson variety was collected in dense beech woods near Witches' Glen on Naushon; seen nowhere else. NAU: 3687 (N).

Rhododendron viscosum (L.) Torr. Thickets and pond borders. NON: 2629 (N); NAS: *Northrop* (o), 1769 (N,P,M); CUT: 2317 (N).

R. viscosum (L.) Torr., var. glaucum (Michx.) Gray. Known only from a single specimen collected by Williams on Nashawena; probably more abundant. NAS: *Williams*, July 10, 1911 (N).

Kalmia angustifolia L. Apparently rare; reported by Mrs. Northrop from Nashawena, but no specimen seen.

Leucothoe racemosa (L.) Gray. Occasional around sandy margins of ponds. NAU: 2482 (P,M), 2938 (N,P).

Lyonia ligustrina (L.) DC. Dense thickets and wet borders of ponds. NON: 2628 (N,P); UNC: 3650 (N,P,M); NAS: *Northrop* (o), 1768 (N,P).

Chamaedaphne calyculata (L.) Moench. Seen growing only around borders of dune ponds on Nashawena. NAS: *Northrop*, Aug. 1901 (Y), 1770 (N,P,W).

Epigaea repens L. Reported by Mrs. Northrop from Nashawena with the remark, "On bank near Mirror Lake." No specimens seen.

GAULTHERIA PROCUMBENS L. Apparently not common. Reported from Nashawena and found there growing sparingly in boggy woods at east end. NAS: *Northrop* (o), 3545 (N).

GAYLUSSACIA DUMOSA (Andr.) T. & G., var. BIGELOVIANA Fernald. See RHODORA, xiii. 95 (1911). Also RHODORA, xxiii. 248 (1921). Decidedly not common; so far known only from Nashawena. NAS: *Northrop*, July, 1901 (Y), *Northrop*, "July–Aug." 1901 (Y), *Taylor*, July 6, 1920 (P).

G. FRONDOSA (L.) T. & G. Occasional in thickets and about ponds. NON: 2236 (N,P); NAS: *Northrop*, Aug. 1901 (Y).

G. BACCATA (Wang.) C. Koch. This is the commonest Huckleberry on the islands; it is everywhere in the open areas, often forming an impenetrable growth in the hollows or under the lee of protecting hills. NON: 2576 (N,P), 2651 (P); NAU: 2504 (P,C), 2941 (N,P, M), 3689 (P); NAS: *Northrop* (o), 3559 (P).

VACCINIUM CORYMBOSUM L. Abundant around ponds, in moist depressions and in boggy woods. NON: 2637 (P); NAS: *Northrop* (o), 3516 (P).

V. ATROCOCCUM (Gray) Heller. Same situations as last but apparently less common; flowers and fruit earlier. NAS: 1776 (P).

V. MACROCARPON Ait. Open bogs and peaty hollows. NAS: *Northrop* (o); CUT: 2313 (P), 2519 (N,P,M).

PLUMBAGINACEAE

LIMONIUM NASHII Small, var. TRICHOGONUM Blake. *L. carolinianum* of the Manual. See RHODORA, xxv. 58 (1923). The following numbers, out of a large series being held for study, may be cited. UNC: 3122 (P); NAU: 2456 (P).

In his recent revision of the Sea Lavenders Blake characterizes the New England material as having the calyx densely pubescent, at least at the base. Nevertheless, specimens collected from the Elizabeth Islands show the calyx nearly smooth or with a few scattered hairs and, according to Blake's treatment, would come closer to *L. carolinianum*, which name he restricts to the southern material with glabrous calyx. It is obvious that the last word has not yet been said concerning this genus as it is represented in the eastern United States.

PRIMULACEAE

SAMOLUS FLORIBUNDUS HBK. Sandy and peaty pond margins; not common. NON: 2873 (N); NAU: 1078 (W), 2722 (N).

LYSIMACHIA QUADRIFOLIA L. Sandy woods; infrequent. NAU: 3327 (P); NAS: *Northrop* (o).

L. TERRESTRIS (L.) BSP. Open bogs and pond borders. NAS: *Northrop* (o), 2344 (N); CUT: 2316 (P).

TRIENTALIS BOREALIS Raf. *T. americana* (Pers.) Pursh. See Blanchard, RHODORA, xi. 236 (1909). Boggy woods. NON: 3297 (N,P); NAU: 3328 (N,P); NAS: *Northrop* (o).

Anagallis arvensis L. Cobble beaches and sandy waste places. UNC: 2957 (N); NAS: *Northrop* (o); CUT: 3434 (P); PEN: 1450 (N,P,W).

OLEACEAE

FRAXINUS AMERICANA L. Certainly not common; seen only on edge of swampy hollow along north shore of Nashawena. NAS: *Northrop* (o), 3480 (N).

F. PENSYLVANICA Marsh. Reported by Mrs. Northrop from Nashawena; no specimen seen.

Ligustrum vulgare L. Escaped from cultivation on Penikese. PEN: 1451 (W).

GENTIANACEAE

BARTONIA VIRGINICA (L.) BSP. Open bogs and peaty hollows or pond borders. PAS: 3782 (P); NAS: *Northrop*, Aug. 1901 (Y), 3508 (N); CUT: 2515 (N,P).

B. PANICULATA (Michx.) Robinson. A single specimen of this species was collected in the woods on Naushon by Professor Fernald and the writer on Aug. 10, 1927, but the material was subsequently mislaid. The plant is surely uncommon on the Elizabeth Islands.

MENYANTHES TRIFOLIATA L., var. MINOR Michx. See RHODORA, xxxi. 198 (1929). Seen growing only in a small boggy area bordering Sheep Pond. NAS: *Northrop* (o); CUT: *Hervey*, no date (N), 810 (P,W).

NYMPHOIDES LACUNOSUM (Vent.) Fernald. Collected in a small pond on Nonamesset. NON: 2707 (P).

APOCYNACEAE

APOCYNUM ANDROSAEMIFOLIUM L. Exposed sandy bank bordering beach on Uncatena; possibly more general. UNC: 3639 (N,P).

ASCLEPIADACEAE

ASCLEPIAS TUBEROSA L. Sandy hillsides and clearings; rare and local. NAU: *Simons*, July 16, 1901 (W), 2602 (N); PAS: 589 (W).

A. INCARNATA L., var. PULCHRA (Ehrh.) Pers. The commonest Milkweed on the islands. Swamps and wet pond margins everywhere. NON: 2674 (N,P); UNC: 3059 (P); NAU: 2736 (N); NAS: *Northrop* (o), 3478 (P); PEN: *Jordan* (o).

A. SYRIACA L. Occasional in dry sandy ground. NAS: *Northrop* (o); PEN: 1452 (W).

A. PHYTOLACCOIDES Pursh. Reported by Mrs. Northrop as *A. exaltata* with the comment "Not uncommon." No specimen seen.

A. VERTICILLATA L. Known only from Mrs. Northrop's collection from Nashawena. NAS: *Northrop*, Aug. 1901 (Y).

CONVOLVULACEAE

Convolvulus sepium L. Occasional in thickets and overgrown depressions. NON: 2890 (P); NAS: *Northrop* (o).

C. sepium L., var. pubescens (Gray) Fernald. On sea beaches; apparently not abundant. PEN: 1454 (N,P,W).

C. arvensis L. Cobble beach of isthmus on Penikese. PEN: 1453 (W).

Cuscuta Gronovii Willd. Swamps, boggy clearings, wet thickets, etc., NAU: *Pennell* 3127 (W), 2495 (P), 2605 (N,P,M), 2914 (P,C), 2933 (P), 3139 (N,P,M), 3890 (P,C); NAS: *Northrop* (o), *Williams*, July 10, 1911 (N), 2353 (P).

This is apparently the only species of Dodder on the islands. A large and variable series has been collected and has been studied in the light of T. G. Yuncker's recent monograph of the genus (1921), but it has not been found possible to recognize more than this single polymorphic species.

VERBENACEAE

Verbena hastata L. Collected on gravelly upper beach on Uncatena and in swampy clearing on Naushon. UNC: 2980 (N); NAU: 2465 (P).

LABIATAE

Teucrium canadense L., var. littorale (Bickn.) Fernald. Abundant near beaches, borders of brackish areas, wet thickets, etc. NON: *Cushman*, July 27, 1906 (B), 2586 (N); UNC: 2960 (P), 3047 (N,P,C); NAU: 1797 (P), 2500 (P,M); NAS: *Northrop* (o); PEN: 1460 (N,P,W).

Trichostema dichotomum L. Frequent on open downs and sandy knolls. NON: 2623 (N); UNC: 2973 (P), 3120 (N); NAS: *Northrop* (o).

Scutellaria lateriflora L. Listed as "common" on Nashawena by Mrs. Northrop; no specimen seen.

S. epilobiifolia Hamilton. *S. galericulata* of the Manual. See Fernald, Rhodora, xxiii. 85 (1921). Abundant in wet hollows and around ponds. NON: *Cushman*, July 27, 1906 (B), 2298 (N,P,C); UNC: 3045 (P); NAU: *Cushman & Morse*, Aug. 25, 1906 (B), *Pennell* 3116 (P), 2373 (P,M), 2607 (N); NAS: *Northrop* (o), 3476 (P); CUT: *Sanford*, Aug. 15, 1917 (N), 815 (W,P); PEN: 1459 (N,P,W), 3406 (P).

Marrubium vulgare L. Sandy soil, waste places. NAU: *Moore* 1904 (N), 814 (W); NAS: *Northrop* (o), *Williams*, July 10, 1911 (N), *Pennell* 2911 (W).

Nepeta Cataria L. Dry, sterile soil. UNC: 3054 (N); NAS: *Northrop* (o); PEN: 1458 (N,P,W).

Prunella vulgaris L. Apparently not common; dry ground. NAS: *Northrop* (o), 3484 (P).

P. vulgaris L., var. lanceolata (Barton) Fernald. Rhodora, xv. 179 (1913). The indigenous variety was met with on dry, sandy slopes near center of Uncatena. UNC: 3032 (P).

Leonurus Cardiaca L. Fairly abundant on Penikese; not collected elsewhere. NAS: *Northrop* (o); PEN: 1455 (W).

PYCNANTHEMUM FLEXUOSUM (Walt.) BSP. Known only from specimen in Woods Hole herbarium collected on Naushon. NAU: *Simons*, July 23, 1901 (W).

P. MUTICUM (Michx.) Pers. Reported and collected by Mrs. Northrop from Nashawena. NAS: *Northrop*, Aug. 1901 (Y).

LYCOPUS VIRGINICUS L. Rare and local on the islands; seen growing only on the sandy beach bordering West End Pond. NAU: *Cushman & Morse*, Aug. 25, 1906 (B), 2926 (N).

L. UNIFLORUS Michx. The most abundant species of the genus here; pond margins, wet hollows, etc. NON: 2565 (N,P,W), 2663 (P); UNC: 2969 (N); NAU: *Williams*, July 10, 1911 (N), 2487 (P); NAS: 2346 (N); CUT: 2525 (N); PEN: 1457 (W).

L. AMERICANUS Muhl. Frequent; moist situations. UNC: 2970 (N); NAS: *Northrop* (o), 3749 (N,P); CUT: 2524 (N,P), PEN: 1456 (N,P,M,W,C).

Mentha spicata L. Occasional in wet hollows. NAS: *Northrop* (o), 3491 (P,M).

M. Cardiaca Gerarde. Reported by Mrs. Northrop from Nashawena; no specimen seen.

M. crispa L. Collected in a swampy hollow at the east end of Cuttyhunk. CUT: 2284 (N).

SOLANACEAE

Solanum Dulcamara L. Seen only trailing over a dense thicket bordering pond on Uncatena. UNC: 3042 (N).

S. NIGRUM L. Very abundant as a littoral plant, often fringing the sandy or cobbly beaches with a solid growth. NON: *Cushman*, July 27, 1906 (B), 2872 (N,P); NAS: *Northrop* (o); CUT: 3446 (P); PEN: 1462 (N,P,W).

S. rostratum Dunal. Sandy waste areas; infrequent. NAU: Taylor, July 24, 1921 (P); PEN: Hollick (o).

S. triflorum Nutt. This western species was found growing on beach near Tarpaulin Cove; possibly introduced in the days when the Cove served as a refuge for sailing vessels. NAU: 1806 (N).

Datura Stramonium L. Sandy and cobbly beaches; of casual occurrence. UNC: 2958 (N); NAU: *Cushman & Morse*, Aug. 25, 1906 (B); PEN: 1461 (W).

D. Tatula L. On Mrs. Northrop's Nashawena list; may refer to the preceding; no specimen seen.

SCROPHULARIACEAE

Verbascum Thapsus L. Open, sandy ground and waste places. NAU: 2720 (N,P); NAS: *Northrop* (o); PEN: 1465 (N,P,W).

Linaria vulgaris Hill. Decidedly not common on the islands; seen only on Penikese. PEN: 857 (W).

L. canadensis (L.) Dumont. Grassy slopes and open sandy stretches. NON: 3373 (P); NAS: *Northrop* (o), 3483 (N); CUT: 2331 (N); PEN: 1464 (P,W), 3403 (P).

Limosella subulata Ives. *L. aquatica*, var. *tenuifolia* of Manual. See Rhodora, xx. 160 (1918). Sandy and muddy margins of ponds on Pasque and Nashawena. PAS: 3745 (N,P); NAS: *Northrop*, "July–Aug." (Y), 2356 (N).

Ilysanthes dubia (L.) Barnhart. Reported by Mrs. Northrop from Nashawena as *I. gratioloides;* no specimen seen.

I. inaequalis (Walt.) Pennell. *I. anagallidea* (Michx.) Robins. See Pennell, Torreya, xix. 149 (1919). Sandy and peaty pond borders. NON: 2702 (N); NAS: *Williams*, July 10, 1911 (N); PEN: 454 (N, P,W).

Gratiola aurea Muhl. Peaty margins of small ponds. NON: 2641 (P), 3194 (N,P), 3383 (N,P); NAU: *Taylor* 2347 (P), 1079 (P,W).

Digitalis purpurea L. A few plants persistent around leper cottages on Penikese. PEN: 1463 (W).

Veronica serpyllifolia L. Reported from Nashawena by Mrs. Northrop; no specimen seen.

V. peregrina L. Occasional in sandy soil. The Naushon material is very sparingly pubescent, approaching var. *xalapensis* (HBK.) Pennell. NAU: 3330 (P); NAS: *Northrop* (o); CUT: *Hervey*, no date (N).

V. arvensis L. Seen only in a sandy field near center of Nonamesset. NON: 3306 (N,P).

Agalinis purpurea (L.) Pennell. *Gerardia purpurea* L. See Bull. Torrey Bot. Club, xl. 126 (1913). Listed by Mrs. Northrop for Nashawena; no specimen seen.

A. maritima Raf. *Gerardia maritima* Raf. Seen only on border of brackish area on Uncatena; probably more general. UNC: 3005 (N,P).

Melampyrum lineare Lam. Mrs. Northrop reports this for Nashawena; no specimen seen.

Pedicularis canadensis L. Dry, sandy beech woods near Hadley Harbor. NAU: 3313 (N,P).

LENTIBULARIACEAE

Utricularia geminiscapa Benj. *U. clandestina* Nutt. In a small pond on Nashawena; probably commoner. NAS: 3504 (P).

U. gibba L. Known only from sheet in Woods Hole herbarium collected on Naushon. NAU: *Simons*, July 23, 1901 (W).

U. biflora Lam. Reported from Nashawena by Mrs. Northrop; no specimen seen.

U. cornuta Michx. Reported and collected by Mrs. Northrop. NAS: *Northrop*, Aug. 1901 (Y).

OROBANCHACEAE

Epifagus virginiana (L.) Bart. Fairly abundant in beech woods on Naushon; should be found on other islands as well. NAU: *Williams*, July 10, 1911 (N), 2937 (P), 3138 (N).

BIGNONIACEAE

Catalpa bignonioides Walt. Well naturalized in certain areas on Nashawena. NAS: 3546 (P).

PLANTAGINACEAE

PLANTAGO MAJOR L. Cobbly beaches, grassy slopes, etc. NON: 2697 (P), 2900 (N); NAS: *Northrop* (o); PEN: 1467 (N,P,W), 3407 (N,P).

P. MAJOR L., var. INTERMEDIA (Gilibert) Dene. Material so labelled was collected by A. H. Moore on Penikese in 1904. Here also may be referred tentatively specimens collected by Hollick on Naushon and by Mrs. Northrop (labelled *P. halophila* Bickn.) on Nashawena. This is done with the realization that the maritime phase of *P. major* is in need of very careful study in order that its status may be satisfactorily determined. NAU: *Hollick*, Aug. 11, 1898 (Y); NAS: *Northrop*, Aug. 1901 (Y); PEN: Moore 1916 (G, N).

P. JUNCOIDES Lam., var. DECIPIENS (Barneoud) Fernald. *P. maritima* of American authors in part, not L. See Fernald, RHODORA, xxvii. 100 (1925). Collected on exposed gravelly bank along north shore of Naushon west of Kettle Cove. NAU: 3876 (N,P).

P. OLIGANTHOS R. & S. *P. maritima* of American authors in part. See Fernald, l. c. 93–104. Salt marshes and brackish muds. PAS: 3740 (N,P,M,C); CUT: 3568 (P).

P. lanceolata L. Grassland; not common. NAS: Northrop (o); PEN: 1466 (P,W), 3394 (N,P).

P. lanceolata L., var. *sphaerostachya* Mert. & Koch. See Fernald, RHODORA, xxiv. 203 (1922). Sandy and cobbly beach on Uncatena. UNC: 3055 (N,P).

P. lanceolata L., var. *sphaerostachya* Mert. & Koch., forma *eriophora* (Hoffmans. & Link) Beck von Man. See Fernald, l. c. Sandy soil at east end of Cuttyhunk. CUT: 2269 (N).

P. aristata Michx. Occasional in sandy fields. UNC: 3652 (N,P); NAU: *Simons*, July 23, 1901 (W); CUT: *Northrop* (o).

P. VIRGINICA L. Mrs. Northrop reports this from Nashawena, saying, "Common on downs, about 2 in. high." No specimen seen.

RUBIACEAE

GALIUM APARINE L. Listed by Mrs. Northrop for Nashawena; no specimen seen.

G. PILOSUM Ait. Dry sandy woods and clearings. NON: 2562 (P); NAU: *Pennell* 3150 (W), 2930 (N), 3686 (P); NAS: *Northrop* (o).

G. CIRCAEZANS Michx. Collected by Pennell on Naushon. NAU: *Pennell* 3110 (W).

G. TRIFIDUM L. Borders of brackish areas; not common. NAU: 2513 (N), 3684 (P,M); NAS: *Northrop* (o), 3541 (P).

Erroneously reported from Penikese; see RHODORA, xxvi. 228 (1924). The Penikese material proves to be *G. Claytoni*.

G. CLAYTONI Michx. Wet thickets, pond margins and grassy slopes; very abundant. NON: 2572 (C), 2646 (N), 2666 (P), 2880 (P), 2906 (P); UNC: 3027 (N); NAU: 2374 (P), 2716 (N,P,M); PAS: 3748 (P); CUT: 2516 (N,P); PEN: 1468 (N,P,W).

G. TRIFLORUM Michx. Collected only at edge of beach near east end of Naushon; possibly more general. NAU: 2457 (N,P).

MITCHELLA REPENS L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

CEPHALANTHUS OCCIDENTALIS L. Not common; collected in boggy pasture on Nashawena. NAS: *Northrop* (o), 3564 (P).

CAPRIFOLIACEAE

Lonicera japonica Thunb. Occasional as an escape. UNC: 3037 (N); PEN: 1469 (N,P,W).

TRIOSTEUM PERFOLIATUM L. Seen only on dry open hillside on Pasque. PAS: 567 (N,P).

VIBURNUM ACERIFOLIUM L. Reported by Mrs. Northrop for Nashawena; no specimen seen.

V. PUBESCENS (Ait.) Pursh. *V. venosum* Britton. See Blake, RHODORA, XX. 11 (1918). This is the only *Viburnum* seen growing upon the islands. It is of frequent occurrence in moist hollows and in thickets bordering ponds. UNC: 3010 (N,P); NAU: 2458 (P,M). 3320 (P,C); NAS: 3489 (N), 3518 (P).

VIBURNUM DENTATUM L. is reported by Mrs. Northrop from Nashawena. It is possible that this refers to the preceding, but in the absence of specimens this record is permitted to stand.

SAMBUCUS CANADENSIS L. Occasional; thickets and moist depressions. NAS: *Northrop* (o), 3488 (N); PEN: 1470 (N,P,W).

CUCURBITACEAE

Cucurbita maxima Duchesne. Sandy soil near cultivated area on Penikese. PEN: 1471 (W).

CAMPANULACEAE

SPECULARIA PERFOLIATA (L.) A. DC. Reported from Nashawena by Mrs. Northrop; no specimen seen.

LOBELIACEAE

LOBELIA CARDINALIS L. Found only in a swampy clearing at the east end of Naushon. NAU: 2466 (P,M).

COMPOSITAE

EUPATORIUM VERTICILLATUM Lam. Mrs. Northrop reports *E. maculatum* from Nashawena, but it is probable that this refers to the plant treated by Wiegand as *E. verticillatum* (See RHODORA, XXII. 57 (1920)),

a coastal plain species the general absence of which from the Elizabeths is indeed surprising. NAS: *Northrop* (o).

E. HYSSOPIFOLIUM L. Rather frequent on open grassy and sandy slopes. NON: 2590 (P); UNC: 2953 (N); NAU: *Oakes?* (Herb. Lowell) (B); PAS: 1790 (P,W).

E. VERBENAEFOLIUM Michx. Reported by Mrs. Northrop from Nashawena; no specimen seen.

E. PERFOLIATUM L. Wet hollows; uncommon. UNC: 2966 (N); NAS: *Northrop* (o).

CHRYSOPSIS FALCATA (Pursh) Ell. Open downs and sandy clearings. NON: 2583 (P); NAU: 2596 (N,P); PAS: 3788 (N); NAS: *Northrop* (o).

SOLIDAGO BICOLOR L. Dry, sandy woods; not abundant. NAU: 3161 (N), 3905 (P).

[S. ULIGINOSA Nutt. is reported from Nashawena by Mrs. Northrop; this doubtless refers to some other species, but since, in the absence of material, it is impossible to say which one, this record is discredited.]

S. SEMPERVIRENS L. Sandy and cobbly beaches. NON: 3211 (P); UNC: 3110 (N); PAS: 3744 (P); NAS: *Northrop* (o); CUT: 2270 (N); PEN: 1492 (N,P,W).

S. JUNCEA Ait. Known only from bare gravelly slopes on Penikese. PEN: 1489 (P,W).

S. SUAVEOLENS Schoepf. *S. odora* Ait. See Standley, RHODORA, xxi. 69 (1919). Collected only in dryish peaty border of bog on Cuttyhunk; perhaps more abundant. NAS: *Northrop* (o); CUT: 2520 (N,P, M).

S. ELLIOTTII T. & G. Dry thickets on Uncatena. UNC: 3105 (P), 3111 (N,P,M).

S. RUGOSA Mill. Dry, boulder-covered slopes on Penikese. PEN: 1491 (N,P,W).

S. RUGOSA Mill., var. ASPERA (Ait.) Fernald. *S. aspera* Ait. See RHODORA, xvii. 7 (1915). Open grassy downs and pond borders. NON: 3186 (N,P,M); UNC: 3093 (P); CUT: 2521 (N,P).

S. NEMORALIS Ait. Dry hillsides. UNC: 2971 (N,P); PAS: 3797 (P); NAS: Northrop (o); PEN: 1490 (W).

S. CANADENSIS L. Collected only on dry southwest slopes of Penikese. PEN: 1488 (W).

S. ALTISSIMA L. Collected only in thickets on dry hillsides of Uncatena. UNC: 3102 (N).

S. TENUIFOLIA Pursh. Everywhere on open downs and borders of *Gaylussacia* thickets. NON: 2561 (P); 3168 (N,P); UNC: 3084 (N, P,M); NAU: *Cushman*, Aug. 25, 1906 (B), 2505 (M,C), 2719 (N,P), 2929 (N,P); NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 455 (N,P,W,M).

S. GRAMINIFOLIA (L.) Salisb. Same situations as the preceding; somewhat less abundant. NON: 3179 (N,P,M,C); UNC: 2952 (N, P); PAS: 3750 (P).

S. MINOR (Michx.) Fernald. This southern species, ranging from Mississippi and Florida to Virginia and reported by Bicknell from Nantucket, was collected by Professor Fernald and the writer on open grassy hillsides near the central part of Naushon. NAU: 2506 (N,P).

ASTER DIVARICATUS L. Occasional in dry open woods. NON: 3193 (N); NAU: 3160 (N,P).

A. PATENS Ait. Grassland and sandy thickets. NON: 3190 (P); NAU: 3142 (N); NAS: *Northrop* (o).

A. UNDULATUS L. Dry woods; common. NON: 3183 (N,P), 3187 (P,C); UNC: 3080 (N,P,M); NAU: 3158 (N,P,M); PEN: 1474 (W).

A. ERICOIDES L. Reported by Hollick from Pasque; no specimen seen, nor has this Aster, so abundant on the adjacent mainland, been found growing on the Elizabeth Islands, despite diligent search for it.

A. MULTIFLORUS Ait. Fairly abundant on grassy slopes. NON: 3184 (N), 3192 (N,P); PAS: 3751 (P,C); CUT: 3577 (P,M); PEN: 1098 (P, W).

A. DUMOSUS L. With the last. NON: 3178 (P), 3189 (N,P,W), 3195 (P); UNC: 2972 (N,P), 3091 (P); NAU: 3144 (P), 3159 (P); PAS: 3764 (N,P).

A. DUMOSUS L., var. CORIDIFOLIUS (Michx.) T. & G. Clearing in dry beech woods near Mary's Lake. NAU: 3145 (N,P).

A. DUMOSUS × ? This plant, probably representing *A. dumosus* × *vimineus*, was collected in sandy woods on Naushon. NAU: 3143 (N).

A. VIMINEUS Lam. Abundant in sandy woods and on open downs. NON: 3196 (P,M,C), 3200 (N,P,W,M); UNC: 3100 (N,P); NAU: 3134 (N,P,C), 3157 (P); PEN: 1475 (P).

A. LATERIFLORUS (L.) Britton. Apparently not common; dry, shady beech woods on Naushon. NAU: 3146 (N).

A. NOVI-BELGII L. Abundant in dry, open ground, especially along borders of thickets; extremely variable. NON: 3181 (W,C), 3182 (M), 3192 (N,P,C), 3201 (N,P); UNC: 3090 (N,P), 3101 (P); PAS: 3771 (P); CUT: 2518 (N).

A. UMBELLATUS Mill. Reported by Mrs. Northrop from Nashawena; no specimen seen.

A. LINARIIFOLIUS L. Dry, open hillsides; not frequent. UNC: 3092 (N); PAS: 3790 (P); NAS: *Northrop* (o).

ERIGERON RAMOSUS (Walt.) BSP. Open sandy slopes. UNC: 3643 (P); NAS: *Northrop* (o).

E. CANADENSIS L. Disturbed, sandy soil; rare. PEN; 1485 (W).

E. PUSILLUS Nutt. See Robinson, RHODORA, XV. 205 (1913). Open, sandy slopes. NON: 2902 (N,P); PAS: 3768 (P); PEN: 1486 (P,W).

SERICOCARPUS ASTEROIDES (L.) BSP. Open downs. UNC: 3062 (N); PAS: 3789 (P); NAS: *Northrop* (o).

S. LINIFOLIUS (L.) BSP. Reported from Pasque by Hollick; no specimen seen.

PLUCHEA CAMPHORATA (L.) DC. Margins of brackish ponds and

borders of salt marshes. NON: 2289 (N), 2662 (P); UNC: 3036 (N); NAU: *Cushman & Morse*, Aug. 25, 1906 (B), 1799 (N,P,W).

ANTENNARIA PLANTAGINIFOLIA (L.) Richards. Grassy knolls and exposed hillsides. NON: 2670 (N), 3280 (N,P); UNC: 3640 (N,P); NAU: 3312 (P); NAS: *Northrop* (o).

A. NEGLECTA Greene. Same situations as last. NON: 3281 (P); NAS: 3506 (P), 3554 (N); CUT: 3458 (N,P).

ANAPHALIS MARGARITACEA (L.) B. & H. Grassland and open ground everywhere. NON: 2560 (P); UNC: 3035 (N); PAS: 3796 (P); NAS: *Northrop* (o); CUT: 3454 (N,P).

GNAPHALIUM OBTUSIFOLIUM L. *G. polycephalum* Michx. Open, sandy and grassy slopes and clearings. UNC: 2954 (N), 3077 (P); NAU: 2730 (N); PAS: 3760 (P); NAS: *Northrop* (o); CUT: *Sanford*, Aug. 15, 1917 (N); PEN: 1482 (N,P,W,M,C).

G. ULIGINOSUM L. Upper beaches and low sandy ground, occasionally bordering salt marshes. UNC: 3006 (N); NAU: *Cushman & Morse*, Aug. 25, 1906 (B), 2388 (N,P); NAS: *Northrop* (o); PEN: 1096 (N,P,W).

G. PURPUREUM L. Dry, sandy soil; rare and local. NAU: 834 (W); NAS: 3507 (N); CUT: *Hervey*, no date (N).

IVA ORARIA Bartlett. Reported by Jordan from Penikese; no specimen.

AMBROSIA ARTEMISIIFOLIA L. Not common except on Penikese where abundant on grassy slopes of peninsula. NAS: *Northrop* (o); PEN: 1473 (P,W).

XANTHIUM CANADENSE Mill. Reported by Mrs. Northrop from Nashawena; no specimen seen.

X. ECHINATUM Murr. Occasional on beaches. NON: 3177 (N), 3914 (P); PAS: 3759 (P); PEN: 458 (W).

Rudbeckia hirta L. Open grassland. UNC: 3641 (P); NAS: *Northrop* (o); CUT: 2329 (N); PEN: 1487 (P,W).

Helianthus annuus L. Sandy ground near area under cultivation on Penikese. PEN: 1483 (P,W).

COREOPSIS ROSEA Nutt. Apparently rare; seen only on sandy beach bordering West End Pond. NAU: 2916 (N,P,M,C).

C. lanceolata L. Persistent around leper cottages on Penikese, where planted. PEN: 1480 (P,W).

BIDENS CONNATA Muhl. Border of small pond in hills at north end of Penikese. PEN: 1476 (N,P,W,M,C).

B. CONNATA Muhl., var. PETIOLATA (Nutt.) Farwell. See RHODORA, x. 197 (1908). Wet borders of ponds; occasional. UNC: 3016 (P), 3115 (N,P); NAU: 3133 (N,P,W,M,C).

ACHILLEA MILLEFOLIUM L. Common everywhere on open grassy hillsides and in sandy fields and clearings. NON: 3166 (N); UNC: 2959 (N); NAS: *Northrop* (o), 3555 (P); CUT: 2260 (P,M), 2322 (N); PEN: 1472 (N,P,W).

Anthemis Cotula L. Disturbed sandy areas. UNC: 2955 (N); NAS: *Northrop* (o); CUT: 3580 (P); PEN: 858 (N,P,W).

Chrysanthemum Leucanthemum L., var. *pinnatifidum* Lecoq. & Lamotte. Certainly not common; occasional on open grasslands. NAS: *Northrop* (o); PEN: 1477 (N,P,W).

Tanacetum vulgare L. Sandy soil near habitations. PAS: 3767 (N); PEN: 1097 (W).

Artemisia Stelleriana Bess. Occasional on sandy and cobbly beaches. NON: *Cushman*, July 27, 1906 (B); CUT: 2275 (N,P,M).

ERECHTITES HIERACIFOLIA (L.) Raf. Sandy clearings; moist pond margins and depressions. NON: 2696 (N); NAU: 2928 (N); NAS: *Northrop* (o); PEN: 1481 (W).

E. HIERACIFOLIA (L.) Raf., var. PREALTA (Raf.) Fernald. See RHODORA, xix. 27 (1917). Moist hollow. NON: 2661 (N,P).

E. MEGALOCARPA Fernald. See RHODORA, xix. 24 (1917). Moist depressions; local. UNC: 2965 (P,C); 2984 (N,P,W,M).

Arctium minus Bernh. Reported by Mrs. Northrop for Nashawena; no specimen seen.

Cirsium lanceolatum (L.) Hill. Sandy and gravelly banks and hillsides. NON: 2693 (N,P), *Cushman*, July 28, 1906 (B); NAU: 2717 (N,P); NAS: *Northrop* (o); CUT: 827 (P,W); PEN: 1479 (P,W).

C. HORRIDULUM Michx. *C. spinosissimum* of the Manual. See Robinson, RHODORA, xiii. 239 (1911). Occasional in open exposed situations. NON: 2299 (N); NAU: Miss Weir, June 22, 1890 (N); NAS: *Northrop* (o).

C. DISCOLOR (Muhl.) Spreng. Occasional in sandy clearings and borders of thickets. UNC: 3104 (N); PAS: 3752 (P).

C. PUMILUM (Nutt.) Spreng. Not common; met with only in grassland on Naushon. NAU: 828 (P,W); NAS: *Northrop* (o).

C. arvense (L.) Scop. Abundant on Penikese, where it forms a fringe on the upper beach to the south; local elsewhere. NAS: *Northrop* (o); PEN: 1478 (N,P,W).

Centaurea arenaria Bieb. Reported from Nashawena by Hollick as the first record for North America;[1] no specimen seen.

Cichorium Intybus L. Listed by Mrs. Northrop from Nashawena; no specimen seen.

KRIGIA VIRGINICA (L.) Willd. Sandy fields. NON: 3305 (N,P); NAU: 3879 (N,P).

K. BIFLORA (Walt.) Blake. *K. amplexicaulis* Nutt. See RHODORA, xvii. 135 (1915). On Mrs. Northrop's Nashawena list; no specimen seen.

Leontodon autumnalis L. Occasional in grassland or on dry banks. UNC: 3060 (N); NAU: 2392 (N); NAS: *Northrop* (o).

L. autumnalis L., var. *pratensis* Koch. In tall grass on slopes at west end of Penikese. PEN: 1484 (W).

Taraxacum officinale Weber. Not common; collected only near landing on Penikese. NAS: *Northrop* (o); PEN: 1496 (N,P,W).

Sonchus arvensis L. Occasional on beaches and sandy areas. NAS: *Northrop* (o); PEN: 1493 (N,P,W,M,C).

[1] Hollick, A. Cont. Geol. Dept. Columbia Univ. xi. no. 72. (1901).

S. oleraceus L. Seen mostly growing in the litter of upper sea beaches. CUT: 3432 (P); PEN: 1495 (N,P,W), 1755 (P).

S. asper (L.) Hill. With the last; less common. CUT: *Pennell* 2992 (W); PEN: 1494 (W).

LACTUCA CANADENSIS L. Reported by Mrs. Northrop from Nashawena; no specimen seen.

L. CANADENSIS L., var. INTEGRIFOLIA (Bigel.) Gray, forma ANGUSTATA Wiegand. See RHODORA, xxii. 10 (1920). Collected in dry, sandy soil at east end of Pasque. PAS: 3773 (P).

L. HIRSUTA Muhl. Seen growing only in sandy woods on Naushon; probably more common. NAU: 2464 (N); NAS: *Northrop* (o).

PRENANTHES SERPENTARIA Pursh. Mrs. Northrop reports this from Nashawena; no specimen seen.

P. TRIFOLIOLATA (Cass.) Fernald. Sandy woods; apparently rare. NAU: 3921 (P).

HIERACIUM PANICULATUM L. Dry, sandy woods; not common. NAU: 3920 (N,P).

H. MARIANUM Willd. Reported from Nashawena by Mrs. Northrop; no specimen seen.

H. SCABRUM Michx. On Mrs. Northrop's list for Nashawena; no specimen seen.

H. GRONOVII L. This is the commonest member of the genus on these islands; dry woods, sandy clearings, etc. NON: 2634 (P), 3185 (P); NAU: 2939 (N); PAS: 572 (W), 3775 (N); NAS: 3536 (P).

H. CANADENSE Michx. Apparently not abundant; collected only in dry, sandy soil at east end of Pasque. PAS: 3774 (N); NAS: *Northrop* (o).

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ERRATA

Page 2, line 26, *for* (plate —), *read* (plate 192)
" 7, last line, *for* (t.), *read* (t. 194)
" 8, line 6 from bottom, *for* (Plate —), *read* (Plate 193)
" 8, " 4 " " , *for* (Plate —), *read* (Plate 194)
" 13, " 43, for *laurentiana*, read *laurentianus*
" 32, " 9, *for* Muhlenburg, *read* Muhlenberg
" 32, " 28, *for* Chesteton, *read* Chesterton
" 40, " 12, for *blanda*, read *pallida*
" 75, " 29, *for* Presl., *read* Presl,
" 76, " 14, for *dilitata*, read *dilatata*
" 81, " 5, for *alpinis*, read *alpinus*
" 84, " 19, for *brecivaudatus*, read *brevicaudatus*
" 89, " 4 from bottom, for *Salviastrium*, read *Salviastrum*
" 104, " 16, for *achrostichoides*, read *acrostichoides*
" 105, " 3 from bottom, for *Hierochole*, read *Hierochloe*
" 151, " 35, *for* virginica, *read* virginiana
" 157, " 15, *for* Vahl., *read* Vahl
" 162, " 1, for *Ceanthus*, read *Ceanothus*
" 163, " 4 from bottom, *for* 1845, *read* 1847
" 177, " 18, *for* E., *read* Eleocharis
" 199, " 30, *for* 1876, *read* 1875
" 202, " 6 of legend, for *Boott*, *read* Boott
" 203, " 6 " " , for *petiolarus*, read *petiolaris*
" 215, " 1 from bottom, *for* cinnamonea, *read* cinnamomea
" 232, " 41, end of line, delete *P.*
" 238, " 14, *for* Vahl., *read* Vahl
" 238, " 27, for "*C. ovata*," read "*E. ovata*"
" 257, " 31, for POLYGANA, read POLYGAMA

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